Navy Medical newsletter

June 1970

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POLICY

The U.S. Navy Medical Newsletter is basically an official Medical Department publication inviting the attention of officers of the Medical Department of the Regular Navy and Naval Reserve to timely up-to-date items of official and professional interest relative to medicine, dentistry and allied sciences. The items used are neither intended to be, nor are they, susceptible to use by any officer as a substitute for any item or article, in its original form. The opinions and conclusions expressed in the articles or items included herein are those of the respective authors and do not necessarily represent the views of the Department of the Navy, the Bureau of Medicine and Surgery or any other governmental department or agency thereof.

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The issuance of this publication approved in accordance with NAVEXOS P-35.

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CONTENTS

Credits: All pictures are Official U.S. Navy Photographs unless otherwise indicated.

Cover photograph reveals a Polaris submarine returning from patrol at Holy Loch, Scotland. The Polaris fleet, supported by Submarine Medical Officers, provides this Nation with its greatest deterrent force.

Page 2. The Surgeon General visits the USS Holland (AS 32).

Pages 12 & 13. Dentcap photos were taken by CPL A. Wiegand, USMC.

from the Chief

In 1967, one of our Navy "205" ocean tugs was borrowed for an unusual voyage. It steamed to Norton Sound, an area off Nome, Alaska, and started a most interesting survey. The Borrowing Agency, U.S. Bureau of Mines, had converted the tug to a mining research vessel, outfitted her with two sea floor drilling rigs and other necessary equipment, christened her the Virginia City, and set out for gold. Over a 180 square mile area near Nome, 56 holes were drilled in the sea floor, near land. The survey was conducted to test techniques for finding minerals. Gold was found in every hole, significant quantities in some.

We in the Navy medical research area have a goal and are concentrating a sizable share of available manpower and money in programs directed toward realization of that goal.

At present, the explorer of the sea is not unlike the American pioneer who struck out for the unknown in the western frontier. All of America has knowledge about the explorations in space and great progress being made there, but I have found that relatively few are aware of the exciting developments in the exploitation of the sea and its vast resources. There is little doubt in our minds that the last productive frontier available for fruitful exploitation is the sea. With 71 percent of this earth's surface covered by sea, it will obviously be the only area in which we can expand our living facilities. Its 850,000 plant species offer a vast treasure of unexplored areas for new drugs and chemicals. Its continental shelves harbor all the remaining precious metals, manganese, oil, and what have you, on this planet. Its giant area is already a favorite place to obtain fish, food, and recreation.

We continue to work in the saturation diving field trying to solve the problem of man's exposure to the hostile environment of the open sea. The problem of keeping the diver warm, i.e., heated suits, heated breathing gas, and a heated diving elevator, still presents operational hurdles to be overcome. However, we are making consistent technical advances in this area.

For ten years or more, many of us have watched hyperbaric oxygen therapy experimentation. In spite of initial enthusiasm, there was really little progress. Approximately two years ago, medical officers at the Naval Hospital, Long Beach, California, started a hyperbaric oxygen (OHP) therapy program in order to treat certain disease states refractory to the usual type of therapy. OHP therapy is, of course, the accepted treatment of choice for decompression sickness and possibly carbon monoxide poisoning; however, we are now trying to settle whether the scope of its application may be safely enlarged to include chronic osteomyelitis, skin ulcers, acute thermal burns, and other conditions. Our Long Beach colleagues feel that an overall beneficial effect on the healing process occurs which shortens the length of hospitalization.

A special three-dimensional microscope for studies of decompression sickness has been developed by scientists of the Naval Medical Research Institute, the University of Michigan, and Jodon Engineering Associates. The prototype holographic microscope system will enable Navy scientists to observe formation of gas bubbles in living tissues and may lead to new treatment and preventive methods of decompression sickness. The microscope allows scientists to explore in detail greater volumes of tissue than has been previously possible. The method shows great potential for related studies of random events such as hemorrhage, microembolization, and blood clotting.

A long-term health study of 1,000 submariners is being undertaken to define life expectancy and morbidity due to illness and injury in this exposed occupational group. The percentage of submarine patrols in excess of 45 days has risen since World War II from 25 percent to 85 percent. The time submerged has risen from 30 to 75 percent of the patrol. Meticulous statistics maintained by Medical Department personnel during Polaris patrols have given information as to the number of patrols which have been altered or aborted because of medical or surgical emergencies among the crew and have provided data for planning medical and personnel equipment carried aboard, training of Medical Department personnel, and management of specific conditions which occur. Although the exact number is classified, I can say that the number of Polaris patrols altered because of medical conditions is small, and our objective is to reduce this number even further.

During this decade, new systems and new approaches to managing our resources must rejuvenate Medicine and related sciences. It is abundantly clear that the future holds great challenge and promise, as well, for those who may wish to pursue careers in Submarine Medicine and Research.

The President of the United States in the name of The Congress takes pride in presenting the MEDAL OF HONOR posthumously to

Wayne M. Caron
Hospital Corpsman Third Class
United States Navy

for service as set forth in the following

CITATION:

For conspicuous gallantry and intrepidity at the risk of his life above and beyond the call of duty on 28 July 1968, while serving as Platoon Corpsman with Company K, Third Battalion, Seventh Marines, First Marine Division during combat operations against enemy forces in the Republic of Vietnam. While on a sweep through an open rice field in Quang Nam Province, Petty Officer Caron's unit started receiving enemy small-arms fire. Upon seeing two Marine casualties fall, he immediately ran forward to render first aid, but found that they were dead. At this time, the platoon was taken under intense small-arms and automatic-weapons fire, sustaining additional casualties. As he moved to the aid of his wounded comrades, Petty Officer Caron was hit in the arm by enemy fire. Although knocked to the ground, he regained his feet and continued to the injured Marines. He rendered medical assistance to the first Marine he reached, who was grievously wounded, and undoubtedly was instrumental in saving the man's life. Petty Officer Caron then ran toward the second wounded Marine, but was again hit by enemy fire, this time in the leg. Nonetheless, he crawled the remaining distance and provided medical aid for this severely wounded man. Petty Officer Caron started to make his way to yet another injured comrade, when he was again struck by enemy small-arms fire. Courageously and with unbelievable determination, Petty Officer Caron continued his attempt to reach the third Marine until he himself was killed by an enemy rocket round. His inspiring valor, steadfast determination, and selfless dedication in the face of extreme danger, sustain and enhance the finest traditions of the United States Naval Service.

The President of the United States in the name of The Congress takes pride in presenting the MEDAL OF HONOR posthumously to

David R. Ray
Hospital Corpsman Second Class
United States Navy

for service as set forth in the following

CITATION:

For conspicuous gallantry and intrepidity at the risk of his life above and beyond the call of duty while serving as a corpsman with Battery D, Second Battalion, Eleventh Marines, First Marine Division, at Phu Loc 6, near An Hoa, Quang Nam Province, in the Republic of Vietnam, on 19 March 1969. During the early morning hours, an estimated battalion-sized enemy force launched a determined assault against the Battery's position, and succeeded in effecting a penetration of the barbed-wire perimeter. The initial burst of enemy fire caused numerous casualties among the Marines who had immediately manned their howitzers during the rocket and mortar attack. Undaunted by the intense hostile fire, Petty Officer Ray moved from parapet to parapet, rendering emergency medical treatment to the wounded. Although seriously wounded himself while administering first aid to a Marine casualty, he refused medical aid and continued his lifesaving efforts. While he was bandaging and attempting to comfort another wounded Marine, Petty Officer Ray was forced to battle two enemy soldiers who attacked his position, personally killing one and wounding the other. Rapidly losing his strength as a result of his own severe wounds, he nonetheless managed to move through the hail of enemy fire to other casualties. Once again, he was faced with the intense fire of oncoming enemy troops and, despite the grave personal danger and insurmountable odds, succeeded in treating the wounded and holding off the enemy until he ran out of ammunition, at which time he sustained fatal wounds. Petty Officer Ray's final act of heroism was to protect the patient he was treating. He threw himself upon the wounded Marine, thus saving the man's life when an enemy grenade exploded nearby. By his determined and persevering actions, courageous spirit, and selfless devotion to the welfare of his Marine comrades, Petty Officer Ray served to inspire the men of Battery D to heroic efforts in defeating the enemy. His conduct throughout was in keeping with the finest traditions of the United States Naval Service.

MEDAL OF HONOR

The Medal of Honor, the highest possible award, was established by Joint Resolution of Congress on 12 July 1862 (amended by Act of 9 July 1918 and Act of 25 July 1963). It is bestowed in the name of Congress upon an individual who, while a member of the Armed Forces, distinguishes himself conspicuously by gallantry and intrepidity at the risk of his life above and beyond the call of duty while engaged in an action against any enemy of the United States; while engaged in military operations involving conflict with an opposing foreign force; or while serving with friendly foreign forces engaged in an armed conflict against an opposing armed force in which the United States is not a belligerent party.

The total number of Navy Medical Department personnel so honored, since 1900, is 26; 20 of them have been hospital corpsmen. The first Navy Medical Department Medal of Honor recipients since the Korean conflict are Hospital Corpsmen Wayne Caron and David Ray.

Wayne Maurice Caron was born on 2 November 1946 in Middleboro, Mass. He attended the Middleboro High School and achieved special recognition from his school and state for creating a scientific exhibit on the physiology of the human eye. Wayne was elected Class President during each of his last 3 years and served as President of the Student Council during his senior year. He earned varsity athletic letters in track, swimming and gymnastics; was a member of the high school Honor Society; and was awarded both the Humanitarian and Achievement awards, a unique combination. Following graduation he enlisted in July 1966, and was Honorman of his company at Great Lakes during recruit training. His peers were always amused by his tap dancing in the passageways and washroom, seldom for exhibition as he was modest and quiet in manner. Hospital Corpsman Caron graduated from the Hospital Corps School at Great Lakes in January 1967 and subsequently entered the on-job-training program at the Naval Hospital leading to technician's certification in EENT. On 5 December 1967 he married the former Teresa Louise Haid, a previous finalist in the Miss Florida competition. On 4 July 1968 he reported for duty with the 1st Marine Division in Vietnam and was killed in action on 26 July 1968. Hospital Corpsman Third Class Caron held the following decorations and medals: Purple Heart, Combat Action Ribbon, National Defense Service Medal, Vietnam Service Medal, Vietnamese Military Merit Medal, Vietnamese Gallantry Cross with Palm, and Republic of Vietnam Campaign Medal. He is survived by his parents, young son, and widow who received his Medal of Honor presented posthumously on 20 April 1970 during White House ceremonies.

David Robert Ray was born on 14 February 1945 in McMinnville, Tenn. A member of both his elementary and high school bands, he was later to participate in the Drum & Bugle Corps during recruit training in San Diego. He graduated with Boy's State Honors from McMinnville High School in June 1963. He studied Zoology and majored in English during two and one-half years at the University of Tennessee. Following enlistment in March 1966, and graduation from Hospital Corps School in San Diego in October 1966, Petty Officer Ray served aboard the USS Haven (AH–13) and the Long Beach Naval Hospital. He reported for duty to 2nd Battalion, 11th Marines, 1st Marine Division at Phu Loc in Quang Nam Province on 12 July 1968. His subsequent request for six months' extension of overseas tour was approved and granted. He was killed in action on 19 March 1969. Hospital Corpsman Second Class Ray held the following decorations and medals: Purple Heart, Combat Action Ribbon, National Defense Service Medal, Vietnam Service Medal, and Republic of Vietnam Campaign Medal. He is survived by a sister, and his parents who received his Medal of Honor presented posthumously on 20 April 1970 during White House ceremonies.

DÉBRIDEMENT *

Débridement is the surgical technique of excising devitalized tissue. The experience in several wars has demonstrated that proper débridement is the key to surgical treatment of soft tissue wounds and provides the best means of reducing morbidity and mortality. In spite of widespread acceptance of this premise, with each conflict the surgical techniques must be relearned. To become expert with débridement one must understand the pathology of the wound, inspect his results, and maintain a constant determination to improve his technique.

The extent of tissue damage is related to the type of missile, its velocity, the rotational axis, and the nature and extent of secondary missiles acting within the tissues.

Skin—The elasticity of the skin allows for stretching as a missile passes through; therefore, damage does not usually extend far beyond the traumatized edges. *Excessive* skin débridement is unnecessary and will make subsequent closure more difficult.

Fascia—Damage to the fascia is related more to loss of substance from a direct effect rather than destruction from lateral energy. The innocuous appearance of the fascia may disguise extensive cavitation beneath. The subfascial plane is a ready avenue for extension of infection after improper débridement.

Muscle—Of the soft tissues in extremities, skeletal muscle is the least able to withstand the shock wave and cavitation caused by dissemination of the lateral energy of a high velocity missile. Devitalized muscle can be recognized by its dark color, soft consistency, noncontractility and decreased bleeding of the cut surface.

Artery—Arterial injuries may be encountered as complete transections, open tears, small holes occluded with thrombus, contusions with intimal tears, contusions with aneurysm formation, and, rarely, local spasm. The microscopic pathology of the high velocity arterial wound extends several millimeters beyond that which is observed grossly. Hematomas adjacent to vessels should be explored to rule out vascular injury.

Tendon and Nerve—Tendon and nerve fibers withstand lateral energy better than skeletal muscle. Since inspection will readily demonstrate the extent of devitalized tissue, conservatism in débridement is recommended.

Technique—Débridement should be performed with a scalpel and not with electrocautery.

For massive wounds when many anatomical structures are involved, débridement may be a very challenging operation in which the surgeon must choose between leaving tissue of questionable viability or causing morbidity by removing viable tissue. A stepwise surgical plan, *detailed knowledge of anatomy,* careful technique, thoroughness, and good judgment are necessary for consistent success. The operation should progress in an orderly fashion with each tissue plane being properly treated as it is encountered.

The incisions should incorporate the wounds of entrance and exit. For extremities longitudinal incisions are preferred because these have the advantage of permitting any necessary extension for adequate exposure and are more easily closed at a later date. When the joint creases are traversed, a curved incision to prevent contractures is indicated. Following the initial skin incision the skin wound is debrided. The ragged, devitalized skin edges should be excised with a scalpel, taking only a *few millimeters* of normal-appearing skin. *Excessive skin débridement is unnecessary* and circular defects are to be avoided.

The fascia should be opened widely. As noted previously, it may appear almost normal and yet hide extensive underlying muscle destruction. Shredded loose fascia should be excised.

After opening the fascia, frequently a bulging hematoma is uncovered. This should be carefully evacuated by suction irrigation and sponging. Copious irrigation at this time is very effective in flushing out clots, debris and foreign material, and exposing hidden vascular injuries. By sharp dissection the devitalized muscle is excised using for criteria of viability, the color, consistency, contractility and type of bleeding. Good hemostasis to prevent excessive blood loss and hematoma formation postoperatively is imperative. Mine explosives are prone to hurl massive quantities of soil into the wounds. Copious irrigation and surgical removal of this material is time consuming but essential to prevent infection. A reasonable effort should be made to remove all foreign bodies in and around the missile tract.

Tendon does not usually require extensive débridement beyond the grossly destroyed fibers. Loose

* Taken from proceedings of CINCPAC Fourth Conference on War Surgery, February 1970.

frayed edges and end should be trimmed. Repair of tendons should not be performed during the initial treatment of combat wounds. Tendons should be covered with soft tissues when feasible. Developing and rotating flaps for this purpose should not be done. Drying of such exposed tendons is avoided by covering them with a strip of vaseline or other impregnated gauze before the dry dressing is applied.

Nerves do not require extensive débridement. Loose strands and all grossly destroyed tissue should be removed. To prevent additional displacement of transected nerves, the epineurium may be tacked to adjacent soft tissue utilizing non-absorbable fine suture material other than silk. Nerves also must be covered by soft tissue. Digital nerves and the facial nerve may be repaired primarily when feasible. Nerve grafts should not be performed during initial débridement.

All wounds in the vicinity of major blood vessels must be explored thoroughly for vascular injury. A distal pulse does not rule out vascular damage. Missed arterial injuries will almost invariably lead to some type of significant complication.

Bone—Clean loose fragments of bone should be retained whether detached or not, in an effort to prevent possible shortening of an extremity. The fragment should be debrided, thoroughly cleansed if necessary, and then returned to its natural anatomic location. Retained pelvic bone fragments associated with bladder or colon wounds frequently become sequestered perpetuating infection and, therefore, these should be removed at the initial surgery. When arterial injuries are associated with unstable fractures, spicules of bone near the repair should be smoothed to preclude subsequent trauma to the repair. Formal arthrotomies should be performed in all wounds involving joints. (See Orthopedic Section.)

Upon completion of débridement, the wound should be a healthy-appearing cavity, with clean tissue edges and adequate exposure of the depth of the wound. Hemostasis is imperative as large quantities of blood can be lost by continued oozing from multiple wounds. Following final inspection of the defect, the wound should be dressed with sterile fine mesh gauze *without drains.* For deep wounds, fluffs of gauze should be laid over the fine mesh gauze but the wound *should not be packed.* Packing creates a "cork", plugging the wound and preventing adequate drainage.

The initial dressing should not be removed until the time of delayed primary closure or redébridement unless signs of infection are present. More complicated or extensive wounds may require special dressing techniques.

Patients presenting extensive soft tissue wounds of the extremities should have the extremity immobilized in a position of function. Casts are preferable to splints as the latter tend to break down.

Débridement of Special Regions

Face—Due to the abundant blood supply and complex anatomic structure of the face, less extensive débridement should be performed. Thorough cleansing is mandatory. These wounds should be closed primarily if possible. An attempt should be made to obtain skin closure without flaps, reserving their use for a more ideal time. Split thickness skin grafts may be used as coverage in large avulsed wounds.

Neck—explore all wounds to rule out vascular, tracheal or pharyngo-esophageal injuries. The neck should be closed primarily after débridement. It is advisable to place a drain to the depth of the wound despite a negative exploration.

Chest Wall—When the intercostal muscles and pleura are involved, a check should be made for intercostal artery bleeding. Defects in the chest wall may require rotation of a flap of muscle or skin and subcutaneous fat to obtain air-tight closure. Exposed costal cartilage should be covered to reduce the possibility of chondritis.

Abdomen—Individual wounds of the abdominal wall require débridement. If a laparotomy is performed, a separate incision through normal tissue should be used whenever possible.

Turning patients to the prone position for débridement of posterior wounds following *prolonged* thoracic or abdominal procedures should be avoided. Such débridement should be done prior to the major procedure if the patient's condition permits or it may be delayed until 24–36 hours postoperatively when the patient's condition has stabilized.

Hand—Hand wounds should be left open following débridement. Again, excessive, needless tissue loss is to be avoided.

External Genitalia—Because of abundant blood supply of the external genitalia, less extensive débridement is required and primary closure with dependent drainage should be performed. Conservatism in testicular débridement is indicated and coverage of exposed testicular tissue should be achieved.

Foot—Foot wounds have been a problem due to inadequate débridement of the plantar tissues. The

bulk of soft tissues in the foot are located on the plantar surface and adequate débridement through a hole on the dorsal surface is impossible. If a deep wound is present, a plantar incision is required. The majority of surgeons have a natural tendency to shy away from plantar incisions fearing a painful scar subsequently. There should be no hesitancy in making a plantar incision to debride the foot. Properly placed incisions between the metatarsal heads avoiding the weight-bearing areas are recommended. Foot wounds are not to be closed.

Common Errors in Débridement

A. Overlooking or missing a wound. Areas in which this is likely are: (1) perineum; (2) rectum; (3) back; (4) scalp; (5) axillae; (6) oral cavity and nasopharynx; (7) beneath previously placed dressings.

B. Pin hole débridements.

C. Coring wounds and inserting drains.

D. Failure to debride through-and-through wounds of an extremity from both surfaces.

E. Removing excessive skin.

F. Gauze dressings packed to become a water and air-tight seal.

G. Improper splinting.

H. Incisions placed in improper directions.

Redébridement is frequently necessary. This does not necessarily mean that the original débridement was inadequate. Between the initial and subsequent débridements there may have been delayed bleeding, extension of local infection or better demarcation of non-viable tissue.

Inadequate Débridement May Occur With:

A. Inexperience and/or lack of knowledge of anatomy of the area.

B. Unrecognized wounds due to incomplete physical examination.

C. Inadequate exposure.

D. Tactical situation—the hospital may be under hostile fire.

E. Heavy casualty load.

F. Fatigue of the surgeon.

G. Minimizing the damage hidden under a small surface fragment wound.

Wound Closure:

Primary repair of combat wounds should be limited to the following anatomical locations:

A. Wounds of face, oral cavity and neck. Drains may be indicated.

B. Wounds of scalp.

C. Wounds of scrotum. Drains should be used.

Delayed primary closure can be effected most satisfactorily approximately four to seven days after adequate initial débridement. It is realized that some wounds will require further débridement and the closure must be delayed for four to seven days more.

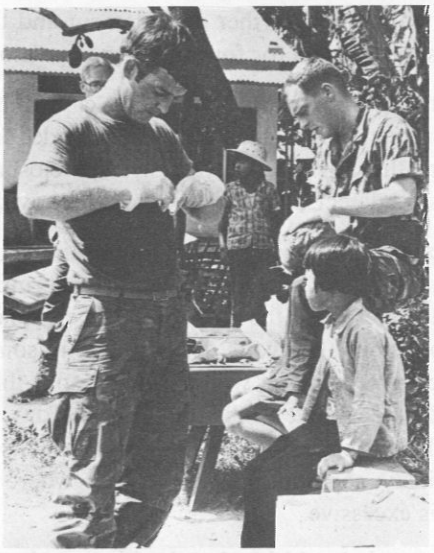
Depending on available anesthesia capabilities, regional or local nerve block will provide adequate analgesia at the time of delayed primary closure. For larger tissue defects, general anesthesia is advised.

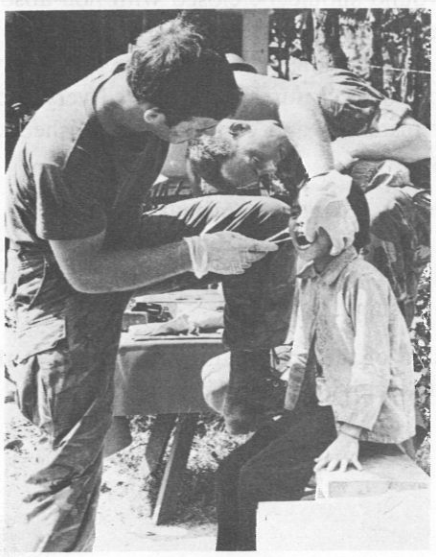
If the wound appears clean on examination, no skin edge excision is recommended. Undermining of the skin edges and the creation of new planes of dissection should be avoided if possible. In some situations, coverage of the wound with a split-thickness skin graft is desirable in the four to seven day period. This will eliminate the possibility of attempting to close widely separated wound edges where suture tension is excessive.

The wound should be closed with non-absorbable, non-reactive suture which should not be buried. Undue tension at the time of closure is to be avoided. Micropore tape closures have proved very successful in many instances and can be accomplished without anesthesia.

In-country, delayed, primary closure is to be avoided unless the surgeon is able to follow the wound long enough prior to evacuation, to insure the absence of suppuration.

Excision of the granulating wound bed at the time of closure is not indicated.





DENTCAPS IN ACTION

By CPL Bard E. VanChantfort, USMC

When a pint-sized Vietnamese patient, like children the world over, balks at the sight of the dental pliers, LT Thomas Barco, DC, USNR, simply bursts into exuberant, and somewhat off-tune, rendition of "Swanee River." Before the youngster has had the time to diagnose the dentist's song, the troublesome tooth has been skillfully yet gently removed.

The cheerful 27-year-old tenor has been the regimental dentist for the 11th Marines, 1st Marine Division, since he came to Vietnam last August.

Aside from a busy schedule of servicing Leathernecks on the unit's compound and those personnel manning isolated combat posts north of Danang, Dr. Barco devotes each Friday to the special mission of bringing dental care to the people of several hamlets in the area.

An oversized military pick-up becomes a mobile dental clinic transporting, with the dentist, Navy Dental Technician Third Class Skip Snedigar, an ARVN (Army of the Republic of South Vietnam) interpreter, a Vietnamese dental nurse, and several "security" Marines from the Civil Affairs Section.

Bouncing across potholes and shimmying its way through mountains of sand, sometimes losing a wheel in the effort, the truck lurches into a remote hamlet. With "security" Marines emerged, dental tools readied and loudspeaker turned on, the interpreter announces the arrival of the Dentcap (Dental Civic Action Patrol).

Adults, many elderly, and children approach some hesitantly curious, others eagerly seeking relief for advanced decay or festering abscesses. The audience may include a few of last week's patients who had

postponed their thanks until they could evaluate the result.

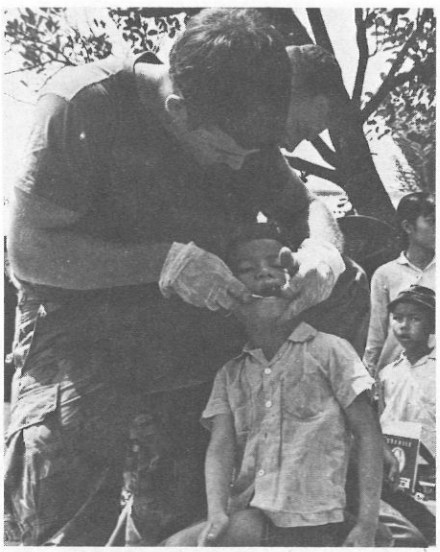
Most of the offending teeth paraded before the dentist, his assistant, and the nurse, require extraction; however, the Dentcap also cleans teeth and fills cavities. Novocain is used to keep the treatment painless. The team sees an average of twenty to forty patients each Friday.

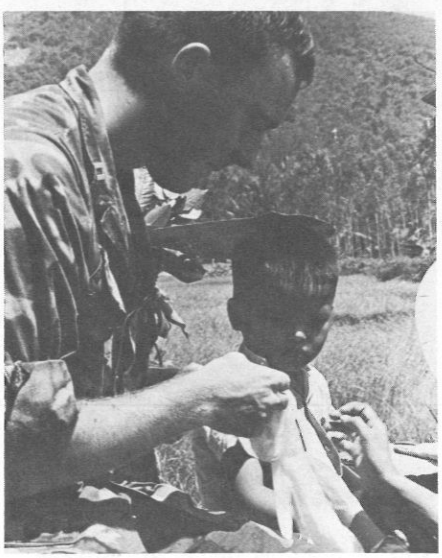
LT Barco began treating the people of nearby Da Son soon after he joined the 11th Marines, and his activities gradually expanded to include four other hamlets. Regular assistance by the regiment's Civil Affairs Section is afforded various projects including Medcaps (Medical Civic Action Patrols).

Because of their proximity, Dr. Barco now treats patients from Da Son in his dental clinic during hours when he is not busy with Marines. He recently fitted the hamlet's Chief with complete upper denture and partial lower denture.

For serious cases such as septic abscesses, in residents of the more distant hamlets, the Civil Affairs team provides transportation for patients to the clinic.

Kim Le, the young Vietnamese nurse who has been trained to assist the dentist, has progressed from simply cleaning teeth to performing extractions and restorations. The regiment plans to use $250 from a fund raised by the unit's Marines to send Kim Le through nursing school so that she will be qualified to continue helping her people with their dental ills when the Marines leave. Dr. Barco also intends to make her the star of a hygienic instruction film he is planning. In it she will, for example, demonstrate and describe the proper use of a toothbrush and the importance of brushing. The movie, with the aid of a portable generator, will be shown by Civic Action patrols which will distribute hygienic supplies.—Public Affairs Office, Headquarters, Force Logistic Command, FPO San Francisco 96602.





The hazards of deep-sea diving are protean. Submarine Medical Officers receive practical experience in diving in order to be more aware of problems.

SUBMARINE MEDICINE

By LCDR A. P. Belmont, MC, USN, Submarine Medicine Branch, Bureau of Medicine and Surgery

"Submarine Medicine" is a term used to describe the Navy's underwater medical activities. These activities include submarines, deep sea divers, underwater swimmers, the "Man-in-the-Sea" project, as well as all hyperbaric and underwater research, both experimental and operational, being conducted at Navy facilities. Billets with the various underwater swimmer groups, at sea aboard submarines, on diving vessels and in research are available to Submarine Medical Officers along both coasts, in Hawaii and overseas.

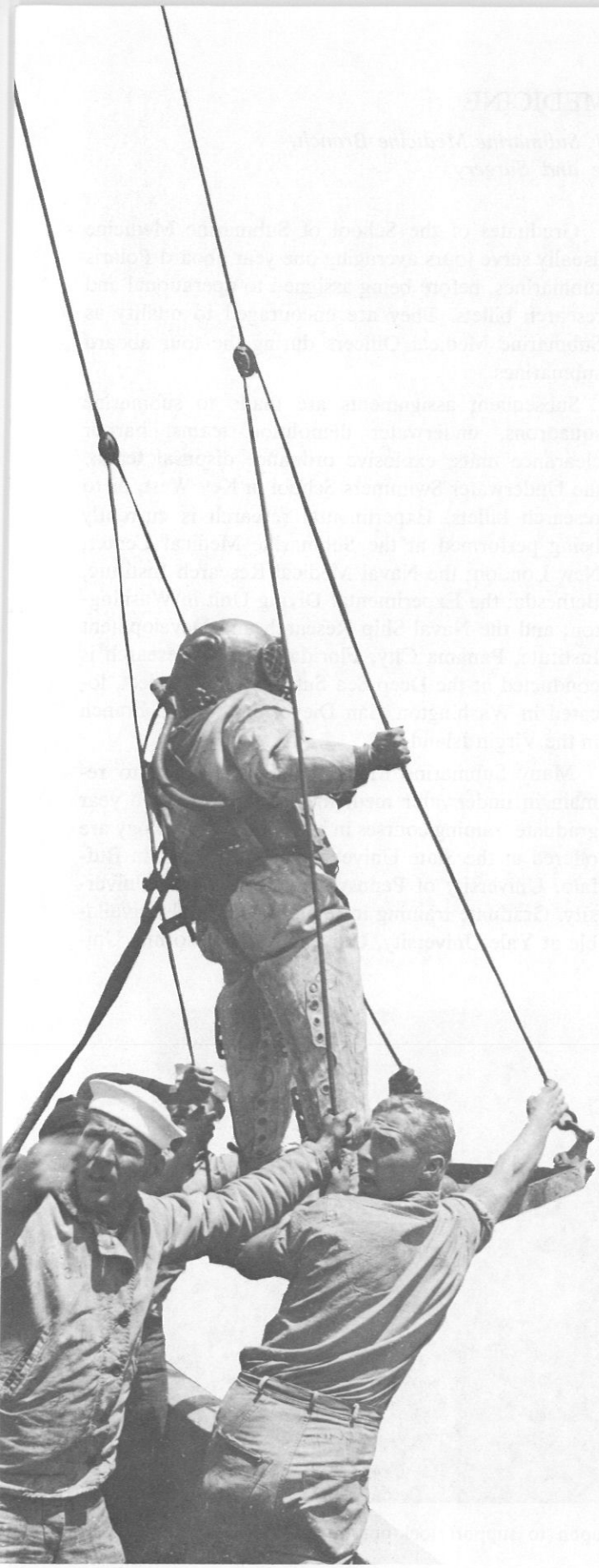
Submarine Medical Officers are trained at the School of Submarine Medicine at the New London Submarine Base. This is a six-month course which emphasizes respiratory and hyperbaric physiology, pulmonary mechanics, and radiobiology. Other sections of this course include practical experience in SCUBA and deep-sea diving, and introduction to submarine handling and reactor theory. Medical officers must agree to extend their obligated service by six months in order to enroll in this course. Graduates of this course are eligible to qualify as Submarine Medical Officers. Qualification depends on preparation of an acceptable thesis on some aspect of Submarine Medicine and on successful completion of a comprehensive examination.

Graduates of the School of Submarine Medicine usually serve tours averaging one year aboard Polaris submarines, before being assigned to operational and research billets. They are encouraged to qualify as Submarine Medical Officers during the tour aboard submarines.

Subsequent assignments are made to submarine squadrons, underwater demolition teams, harbor clearance units, explosive ordnance disposal teams, the Underwater Swimmers School in Key West, or to research billets. Experimental research is currently being performed at the Submarine Medical Center, New London; the Naval Medical Research Institute, Bethesda; the Experimental Diving Unit in Washington; and the Naval Ship Research and Development Institute, Panama City, Florida. Applied research is conducted at the Deep Sea Submergence Project, located in Washington, San Diego, and with a branch in the Virgin Islands.

Many Submarine Medical Officers decide to remain in underwater medicine for careers. Two year graduate training courses in hyperbaric physiology are offered at the State University of New York in Buffalo, University of Pennsylvania, and Duke University. Graduate training in related fields is also available at Yale University, University of California, Uni-

Submarine Medical Officers frequently are called upon to support lock-out operations from submerged submarines.



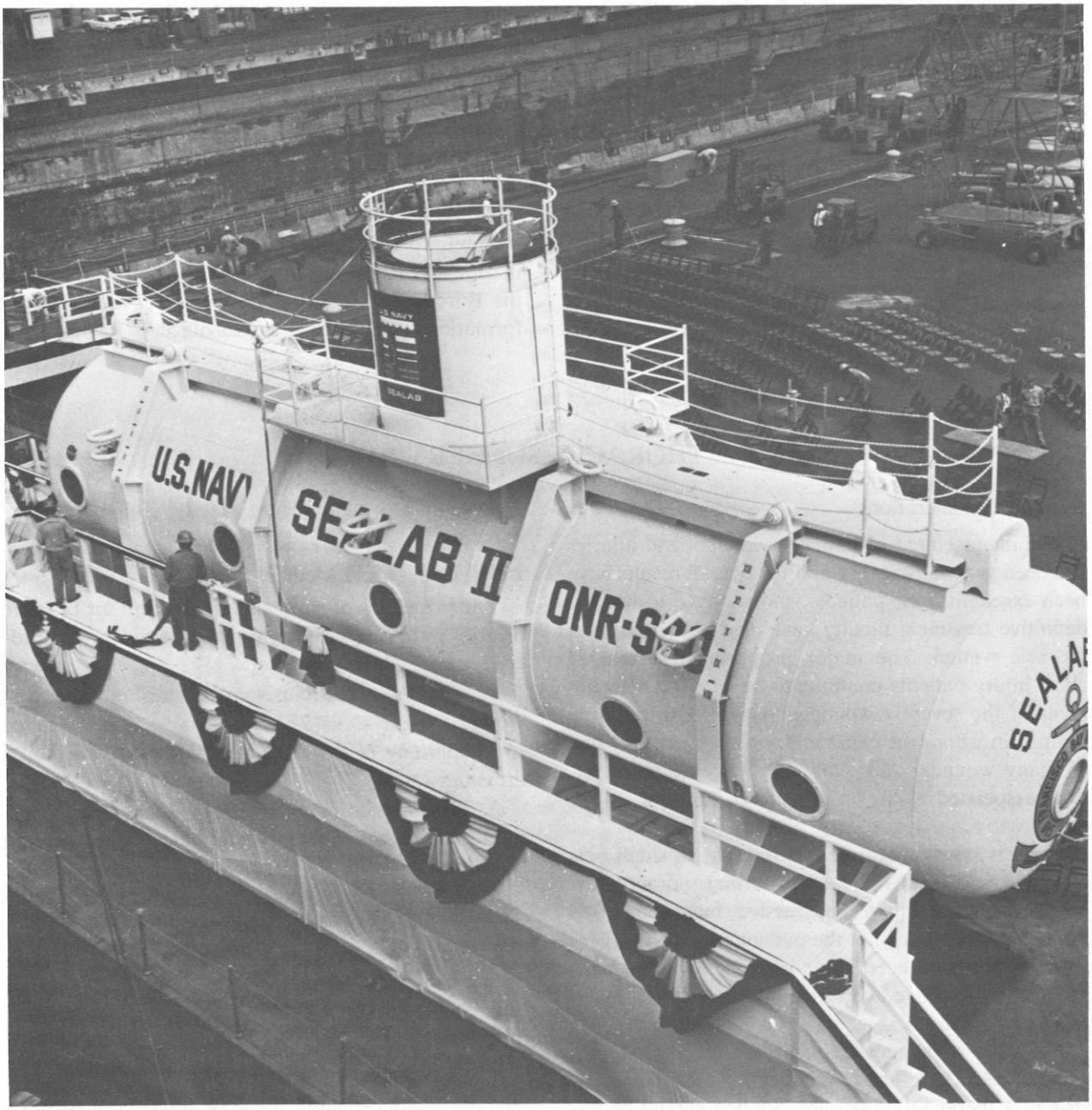
versity of Pittsburgh, and at the University of Rochester. The Navy is the only Federal institution active in biomedical underwater research. There is no counterpart to NASA as regards the exploration of hydrospace. Submarine Medical Officers active in this field enjoy international stature and distinction, frequently being called upon to participate in international panels, conferences, and meetings. In addition, an exchange program with the Royal Navy has been in operation for several years. A medical officer is assigned to duty with the Royal Navy's Institute of Naval Medicine at Gosport, England. Correspondingly, a British medical officer is assigned to the Naval Medical Research Institute. Both medical officers are active in hyperbaric research.

As an operational military medical specialty, Submarine Medicine offers career medical officers the opportunity to vary the nature of their assignments between clinical tours and operational or research billets. For example, the Senior Submarine Medical Officer in the Pacific area, currently assigned to the Commander, Submarine Force, Pacific Fleet, spent his previous tour as senior obstetrician-gynecologist at a naval hospital. Similar opportunities are available in other clinical specialties.

Those Submarine Medical Officers who choose to pursue clinical specialties enjoy a higher selection rate for the naval residency training than do other applicants. Fifty-six percent (56%) of Submarine Medical Officers who applied for clinical residencies were accepted, whereas the percentage for other applicants during the past year was 40%.

Tours on board Polaris submarines compare favorably with other operational billets. Polaris submarines are home-ported only in New London, Connecticut; Charleston, South Carolina; and Pearl Harbor, Hawaii. Advance ports are Holy Loch, Scotland; Rota, Spain; and Guam, M.I. Patrol cycles are such that when one crew is operating the submarine out of the advance port, the alternate crew is at the home port in a training status. The crews alternate every 3 months. To describe the complete patrol cycle for a medical officer, assume that assignment is to a submarine home-ported in New London and advance-ported in Holy Loch:

The entire crew flies from New London to Holy Loch, where the submarine is returning from patrol. Crew transfer takes place and your crew assumes control of the boat. The alternate crew then flies back to New London. The first month is spent alongside the submarine tender, loading supplies, testing equip-



Research in underwater living is carried out in the "Man-in-the-Sea" project associated with the Deep System Submergence Project. Six Submarine Medical Officers are assigned to this project.

ment, and readying the boat for sea. During this period, the medical officer loads medical supplies and tends to the health of the crew. Ample time is available, however, for travel within the British Isles. At the end of 1 month's time the submarine leaves for patrol. Approximately 60 days are spent submerged at sea, with the submarine's mission being to keep the 16 missiles aboard hidden and ready to fire. Upon completion of patrol, the boat returns to Holy Loch, where the alternate crew is waiting and crew transfer again takes place.

The crew then returns to New London where family reunions occur. The first month is rest and relaxation, with no assigned duties for the medical officer. Leave is available during this period, and many medical officers actually begin their leave at Holy Loch, then touring Europe with their wives. Travel in Europe and, of course, return to New London is availa-

ble at no cost on the Military Air Transport System. The first 2 weeks after R & R are available for the medical officer to spend at a military or university medical center of his choice in the general vicinity of his home port, in a discipline of his choosing. The remaining 6 weeks are spent in the station hospital in a clinic of his choice, and in preparing his crew to go back to sea. Then, the crew flies back to Holy Loch and the cycle begins again.

During the entire time he is assigned to a submarine, whether at sea or at the home port, the medical officer receives submarine pay, in addition to all his other pay and allowances. Also, submarine duty exposes a medical officer to the most sophisticated equipment and personnel in the Navy. Submarine line officers are active, intelligent, and creative thinkers, coming from an educational background similar to that of the medical officer. Association with these men is stimulating, as is the chance to participate in an advanced program of far-reaching consequence.

Submarine programs are administered by the Submarine and Radiation Medicine Division, Code 74, at the Bureau of Medicine and Surgery. Additional information is available from this office.

THORACIC SURGERY *

General Considerations

The management of patients with thoracic injuries has been very satisfactory and the overall results have been excellent. Few patients who survived to reach a definitive treatment facility have died as a result of a thoracic wound. The major problems in managing chest injury patients continue to be (1) the management of the severely wounded patient with multiple injuries in whom the chest injury represents only one of many wounds; and (2) pulmonary decompensation associated with trauma (wet lung or shock lung).

Conservative management is the rule. A small percentage of patients will require formal thoracotomy. Vigorous, conservative, aggressive management is necessary whether or not the patient comes to surgery later. There have been some improvements in management which have evolved from the Vietnam experience. These are:

1. Earlier and more frequent use of large caliber chest tubes. There are few indications for thoracentesis as a therapeutic measure. Suction should be applied to all chest tubes when the patient arrives at a hospital location.

2. More frequent use of positive pressure ventilatory assistance.

3. Use of blood gas determination as an indication of the severity of injury and the effectiveness of therapy.

The overall goals in the management of the chest injury of a patient are:

1. Obtain a clear tracheobronchial tree.

2. Restore blood volume.

3. Obtain a clear pleural cavity (full pulmonary expansion).

Initial Care (Field Medical Facilities)

The principles of early emergency care for thoracic injuries were reviewed by the group and were considered sound. These consist of:

1. The use of occlusive dressings on all chest wounds.

2. Splinting of the unstable chest wall with bulky dressings.

3. Proper positioning of the patient with the injured side down or transportation in a semi-sitting position if feasible.

4. Venting of the pleural cavity with a chest tube when indicated.

5. Early encouragement of the patient to breathe deeply and cough.

6. The initiation of fluid therapy.

7. Nasal oxygen, if available.

It was agreed by the group that a chest tube can and should be placed in the pleural cavity at forward medical locations. The chest tube should be single and of a large bore size, preferably 36 to 40 F. It should be placed in the low anterolateral chest on the side of injury avoiding thoracotomy incisional sites. It was felt that a properly placed venting chest tube did not offer a significant hazard to the patient. It was recognized that misplaced and ill-applied chest tubes could be harmful to the patient. However, it was considered to be an acceptable risk in view of the benefits of early placement of the chest tube. Experience with the Heimlich valve has shown the valve is of great benefit in removing the air in pneumothorax but is less effective in draining blood in hemothorax.

* Taken from proceedings of CINCPAC Fourth Conference on War Surgery, February 1970.

It is mandatory that these valves be placed properly. Instances were reported in which valves were inserted backwards, tubes were clamped proximal to the valves, valves were broken and the surrounding plastic bag was not vented.

Initial Hospital Management

The principles of early resuscitation within the hospital were reviewed and considered sound. Attention to the airway including the early use of tracheostomy for resuscitation was considered most important. Fluid and blood replacement, relief of pain and proper positioning of the patient are all considered important. Most patients with a significant thoracic injury have a central venous pressure catheter in place. If a venting pleural cavity tube has not been placed prior to hospitalization, then a single large bore chest tube should be placed in the lateral chest wall in the axillary line for immediate venting. If there is obvious hemo or pneumothorax on physical examination, the chest tube can be placed prior to X-ray examination. In patients whose clinical condition permits and who do not appear to be deteriorating significantly or in whom aeration appears to be satisfactory, X-ray evaluation prior to placement of the chest tube is indicated. The group felt that if the patient was subjected to the trauma of transportation to the X-ray facility, then lateral views should be obtained in addition to the standard posterior-anterior view. If at all feasible upright films of the chest should be made. WARNING: This may constitute a tilt-test and due consideration must be given to cardio-respiratory stability. Supine and table-top lateral abdominal films should be obtained on all chest injuries.

It was considered most important that with the use of a single chest tube, constant adequate suction (usually 20 to 30 cm H_2O) should be applied as soon as possible. This offers more rapid evacuation of air and blood from the pleural cavity and early reexpansion of the lung. If a single chest tube did not clear the pleural cavity, then upper and lower chest tubes should be used without hesitation. As soon as feasible the position of the chest tube(s) should be checked by X-ray and repositioning done if necessary. Patients with minimal chest injury, even though the lung may be fully expanded, may develop pneumothorax under anesthesia. Consideration should be given to placement of a chest tube prior to anesthesia or constant alert be maintained for this occurrence during anesthesia. (Expiration chest films may be of value in demonstrating a small pneumothorax.)

Vigorous tracheobronchial toilet must be employed to prevent pulmonary complications. Relief of pain is essential to permit patient to cough and to clear the tracheobronchial tree voluntarily. Measures to relieve pain consist of the judicious use of narcotics and intercostal nerve blocks.

Following treatment methods are in general use:

1. Conservative management of the intrapleural damage with débridement and closure of the chest wall in accordance with priorities established for any wound. This includes continued stabilization of the chest wall by whatever means necessary including ventilatory assistance and tracheostomy.

2. Use of the wound opening for intrapleural exploration during the time of wound débridement is acceptable. Removal of blood and blood clots, control of hemorrhage, and removal of easily accessible foreign bodies can all be successfully employed, utilizing the thoracic wound. The chest wall wound can be extended to provide a limited thoracotomy opening for better exposure when indicated. In general, extension of the wound should be employed when the chest wall wound is properly located, not severely contaminated and problems in wound closure will not result.

3. Formal thoracotomy is performed upon specific indication.

Indications for Thoracotomy

The indications for thoracotomy are: (1) bleeding; (2) air leak; (3) mediastinal injury; (4) the chest wall wound itself; (5) use of thoracotomy for closure of right diaphragm when not possible at laparotomy.

Continued or massive intrathoracic bleeding has been the major indication for thoracotomy in nearly all experience. The next most frequent indication for thoracotomy is large defects of the chest wall which require surgical attention. Air leak and mediastinal injuries are uncommon causes for thoracotomy. Recently it has been recognized that rarely thoracotomy and major lung resection may be indicated for early treatment of extensive pulmonary contusion manifested by lobar consolidation and hypoxemia not responding to oxygen therapy. CAUTION: Most pulmonary contusions respond to conservative management, and thoracotomy should be undertaken only after careful documentation of the threat to the patient's life (continued failure of PO_2 to respond to positive pressure respiration and high O_2 flow; massive hemoptysis). Thoracic surgical consultation should be obtained.

The large wound of the chest wall presents no difficulty in recognizing the need for at least a limited

thoracotomy. The major problem in determining the need for early thoracotomy is continued intrathoracic bleeding. Continuous observation is essential. The amount of bleeding cannot be specified; surgical judgment must be employed to determine if there is a continuing blood loss of significant amount after initial successful resuscitation. Massive air leak is not a common problem since tracheal or bronchial rupture occurs more frequently in those patients who sustain fatal wounds. Patients with a large air leak should be managed conservatively initially to ascertain its size and nature. With suction temporarily discontinued the patient who can develop negative intrapleural pressure on inspiration probably does not have a major bronchial injury and, in general, will not require surgical correction of the leaking area. The diagnosis of bronchial rupture may be confirmed by bronchoscopy or bronchogram. Thoracic surgical consultation should be obtained while conservative treatment continues.

Surgical Management

Small wounds of entrance and exit are debrided frequently under local anesthesia. When severe contamination or significant devitalized muscle is not present, these can be closed primarily successfully. *IF ANY DOUBT EXISTS,* the skin and subcutaneous tissue should be left open for delayed primary closure. Larger wounds of chest wall require general anesthesia and endotracheal intubation for surgical management. The skin and subcutaneous tissue should be left open for delayed primary closure. If the pleural cavity is open, inspection and any necessary corrective measure should be employed. This is generally limited to careful inspection of the chest wall to insure that hemorrhage is controlled, clearing the pleural cavity of blood and blood clots and removal of partially detached lung. Usually, the originally placed chest tube is replaced by anterior and posterior chest tubes for optimum drainage.

Chest wall defects should be closed with adjacent normal tissue and use of prosthetic materials is not condoned. Muscle flaps should be devised to close the defect without tension. If this is not possible, closure of the skin over the defect with reinforcement by a bulky dressing may be necessary. Rib fragments should be removed and injured rib ends should be smoothed to prevent subsequent lung damage. Chest wall instability should be anticipated and managed by tracheostomy and *controlled* ventilation as in any flail chest.

Separate formal thoracotomy is more commonly used to control bleeding or to perform pulmonary resection. The incision may require modification to avoid vascular compromise of tissue between the incision and a nearby wound. Resection of lung (usually lobectomy) is done for two chief reasons: hilar damage to the bronchus or artery and massive lobar destruction. Resection should be avoided if only contusion or through-and-through missile holes are present. Resection is generally preferred to repair of a major bronchial injury especially if tailoring or a complicated repair is required due to loss of membrane or cartilage fractures.

Injuries to the Heart and Great Vessels

Rarely does a patient with a major cardiac or great vessel wound survive to reach a medical facility in spite of rapid helicopter evacuation. The two principal indications for operating on wounds of the heart and great vessels are (1) bleeding, and (2) tamponade. Patients with evidence of small penetrating wounds to the heart with normal vital signs should be observed carefully. Chest X-rays should be taken serially, electrocardiographic determination should be made and central venous pressure should be monitored carefully.

Cardiac tamponade should be suspected in all patients who do not respond to the usual resuscitative measures for patients with thoracic injury. It should be especially suspected in those patients who demonstrate a missile fragment on X-rays in the location of the heart or great vessels. Persistent rapid pulse and respiration were considered suspicious of tamponade. Distention of the neck veins, elevation of central venous pressure, decreased systolic pressure, narrowed pulse pressure and quiet heart sounds were considered significant findings. A large cardiac silhouette is not necessary or usual for the diagnosis. Paradoxical pulse and blood pressure are relatively late findings.

Paraxiphoid needle aspiration should be done for diagnosis and to aid in stabilizing the patient's condition. In the vast majority of instances preparation for immediate thoracotomy should follow. Rarely, if needle aspiration corrects all abnormalities, continued close observation may be maintained. Repeated therapeutic aspiration is not advised. If the condition recurs after one aspiration then operation is indicated. Midline sternotomy incision is recommended. Associated injury may dictate use of standard thoracotomy incisions.

The indications for removal of foreign bodies in the heart were reviewed and in the absence of cardiac tamponade it was felt that the patient should not be explored initially for the removal of foreign body.

The policy established at the previous conferences of not attempting to remove metallic fragments unless there is hemorrhage, infection, tamponade or recurrent pericardial effusion was confirmed. Late removal of metallic foreign bodies in the region of the heart in an asymptomatic patient was considered a matter of overall evaluation of the patient and surgical judgment. All such patients should be treated at facilities having cardiopulmonary bypass.

Wounds of the Esophagus

Intrathoracic wounds to the esophagus are rare in all past experience, probably because esophageal injury is associated with major lethal injuries to major vessels or the heart. However, the unrecognized esophageal rent is a lethal injury. Preoperatively, if conditions permit, radiopaque studies are indicated when a missile tract can be surmised to have passed close to the esophagus. Similarly, at the time of thoracotomy, the esophagus should be exposed in these types of wounds. Suture closure and drainage by intrapleural chest tube is the treatment of choice leaving the mediastinal pleura widely open. If closure is not technically feasible, careful dependent catheter drainage is mandatory.

Thoraco-Abdominal Injuries

The thoracic injury should be managed conservatively and abdominal exploration performed as the method of choice in the vast majority of patients. If both laparotomy and thoracotomy are required, separate incisions are usually employed. Thoraco-abdominal incisions are sometimes necessary. The site of initial exploration is determined by the clinical condition of the patient. In all penetrations of both the abdominal and thoracic cavities, the diaphragm must be repaired with non-absorbable suture. In most instances this can be accomplished during the laparotomy. Occasionally, a small separate thoracotomy incision is required to repair the right diaphragm when this is not possible from below. Total management of the abdominal injury cannot be accomplished through the thoracotomy incision. If thoracotomy is required in patients with intraperitoneal injury, then subsequent laparotomy will be necessary for complete exploration.

Pulmonary Insufficiency Associated with Thoracic and Non-Thoracic Trauma

Pulmonary Decompensation, also known as "wet lung" or "shock lung" frequently follows direct pulmonary trauma, fat embolus, and burns and is seen less commonly in non-thoracic trauma. This entity has been attributed to multiple factors, some of which are:

Prolonged periods of hypoventilation and secretion accumulation

Prolonged respiratory alkalosis

Surfactant depletion

Overtransfusion or overhydration

Congestive atelectasis

Oxygen toxicity

Pulmonary hypertension due to venous constriction

Pulmonary blast injury with spalling and implosion damage

Bacterial endotoxins

Pulmonary capillary micro-emboli with release of vascular toxins.

It is likely that multiple factors may be at fault in any single case. The incidence of this problem has decreased since colloid and cystalloid solutions have been given with increased caution. Mortality has also declined due to prompt recognition, diagnosis and treatment of patients with this complication. Improved pulmonary care generally, with endotracheal toilet, physical therapy, judicious use of oxygen, and increased use of respiratory support or control in massive wounds have also contributed to increased survival.

This pulmonary decompensation is characterized by an increase in respiratory rate, a decrease in tidal volume, a decrease in pulmonary compliance and an increase in pulmonary venoarterial shunting and the work of breathing. Immediate factors promoting these changes associated with direct trauma to the lung include the spread of blood by aspiration into uninvolved portions of the tracheobronchial tree with inactivation of surfactant, plugging of alveolar ducts and atelectasis, the retention of tracheobronchial secretions secondary to the splinting of the chest wall and/or ineffective cough mechanism.

A second type of decompensation may present within hours or three or more days following injury. The most recent evidence establishes disseminated intravascular coagulation and pulmonary micro-emboli as the major causes. Platelets, fibrin degeneration products, fatty acids, etc. release histamine, serotonin, vasoactive amines and other unidentified products which cause increased capillary permeability and permit red cells and protein rich fluid to enter the alveoli and interstitial tissue.

Irrespective of the exact mechanism leading to the development of the pulmonary decompensation the following clinical and laboratory findings may be expected:

1. Tachypnea—30 or more shallow breaths/minute

2. Tachycardia—120–160 per minute

3. Respiratory alkalosis

4. Hypoxemia—PO_2 less than 60 mm Hg

5. Radiographic appearance of diffuse, fluffy, exudates in both lung fields. The X-ray commonly lags behind the clinical and physiologic deterioration of the patient.

6. Central venous pressure in *normal* range.

If left untreated, this pulmonary decompensation is progressive with (1) confluent areas of consolidation on X-ray; (2) cyanosis; and (3) respiratory acidosis. Terminally, there may be a fall in blood pressure, anuria and pulmonary edema not necessarily associated with a high central venous pressure. At autopsy pleural effusions are frequently present, the lungs are markedly increased in weight, firm and liver red in color. When the lungs are sectioned, they are noted to be airless and the cut surface oozes a bloody, bubbly fluid. The tracheobronchial tree is filled with a bloody, tenacious fluid.

Microscopically, the alveolar septi are thickened and edematous. The capillaries are dilated and engorged. The alveolar spaces contain, either singly or in combination, extravasated red cells with homogeneous eosinophilic material consistent with edema formation. Often intermixed with the edema fluid are pigment-laden, pneumocystic macrophages. In the more consolidated areas there are well-formed hyaline membranes. Electron microscopy has been necessary to demonstrate capillary thrombo-embolic phenomena.

Treatment

Due consideration must be given to previously cited factors which have reduced both incidence and mortality of the "Wet Lung". Onset of this syndrome may first be manifested by decreased pulmonary compliance (as determined by Wright ventilometer). Treatment aimed at improving oxygenation must be instituted promptly.

1. Controlled ventilation preferably with a tracheostomy and Emerson respirator are preferred, but endotracheal intubation and assisted positive pressure breathing *may* suffice. Occasional cases have survived after ventilation with pressures of greater than 60 cm of H_2O. The respirator must be adjusted to permit adequate expiratory time and associated cardiac filling.

Ventilation must be continued several days and until clinical condition and oxygenation permit gradual weaning from the respirator.

Oxygen therapy is essential and where possible should be monitored to preclude a PO_2 greater than 200 mm Hg to reduce the risk of oxygen toxicity. Meticulous aseptic pulmonary toilet is essential to preclude introduction of infection.

2. Diuresis must be promoted with furosemide (40–100 mg) or ethacrynic acid in spite of a normal CVP and apparently adequate urine output. (Urine output of 5–6 L/day without changing the CVP is a common occurrence).

3. Fluids must be restricted during the acute phase of the problem (1000–1500 cc maximum per day). Administration of as little as 500 cc of saline during the recovery phase has again precipitated pulmonary edema.

4. Pulmonary hypertension can be reduced by administration of Thorazine and oxygen. Thorazine should be given intravenously with caution, titrating dose to effect. (1–10 mg q/2–4h)

5. Decadron has been given empirically in many cases. Decadron appears to prevent further platelet aggregation and enhance recovery of the capillary and interstitial damage. A decreasing dosage schedule at 6 hour intervals starting with 12–16 mg is suggested.

6. *Heparinization* is second only to ventilation in importance. Heparin reduces further platelet aggregation and thrombus formation, has an anti-serotonin effect reducing the vascular damage, and is effective in treating hyperlipemia and problems common to fat embolus. A dosage schedule of 3–5 mg/kg/24 hours in divided doses intravenously every 4 hours is suggested and is unlikely to provoke bleeding from wounded areas. Alcohol and Dextran have been used for similar effects, but impose the problem of increasing the circulating fluid volume.

7. *Antibiotic* therapy should be modified according to cultures and sensitivity of tracheal organisms. (These patients are particularly susceptible to pulmonary infection and attention to detail is essential to survival.)

8. *Sedation* is necessary to allay anxiety, reduce pulse and respiratory rates, and permit synchronization with the respirator.

Conclusion

This problem is still only partially defined and additional information is needed to expand our knowledge of the condition and permit totally effective therapy. Patients with acute pulmonary insufficiency do respond to a prompt program of therapy, but piecemeal institution of the above mentioned treatment will probably be disastrous.

Later Complications

The most frequent late complications are recurrent pneumothorax, bronchopleural fistula, clotted hemothorax, empyema and unresolved parenchymal hematoma.

Pneumothorax has recurred at all echelons of medical treatment. The presence of a fully expanded lung is no guarantee that this complication will not occur.

Current experience from PACOM hospitals indicates that decortication is required in only 1% of chest injury patients received at this level. Vigorous physiotherapy and measures to improve lung expansion usually results in remarkable improvement obviating the requirement for decortication.

Empyema is seen in very few patients. Standard treatment methods consist of closed tube drainage, then conversion to open drainage. Observation from Army hospitals in Japan reveals this method of treatment has been successful in the majority of cases.

Pulmonary parenchymal hematoma will usually resolve without complications. Occasionally these will cause sepsis or hemorrhage. Evaluation by a thoracic surgical specialist should be obtained.

Evacuation Procedures

Patients should not be evacuated for at least 72 hours after chest tube removal and a chest X-ray interpretation should be obtained just prior to evacuation irrespective of the timing of chest tube removal.

Patients with active chest tube drainage should have evacuation deferred. If evacuation is unavoidable then the Heimlich valve should be attached to the chest tube with full recognition that the valve is no substitute for underwater seal suction drainage. As a precautionary measure the valve may be attached and chest evaluation obtained 24 hours later—and before evacuation. The valve should be checked for correct alignment and the bag should be vented.

Failure to comply with these simple precautionary measures potentiates development of complications.

THE GASTROENTEROLOGIST CORNER—INTESTINAL ABSORPTION AND MALABSORPTION (Conclusion)

By CDR Alfred R. Chappelka, Jr., MC, USN, Gastrointestinal Branch, Medical Service, Naval Hospital, Philadelphia, Pennsylvania

Carbohydrates

Dietary Intake

The average diet contains 50–60% carbohydrates consisting primarily of starch and glycogen plus small amounts of disaccharides and monosaccharides. Starch is supplied in the form of flour, potatoes, and vegetables, while glycogen is derived from meat sources. Both are composed of maltose (glucose alpha 1–4 linkage) and isomaltose (glucose alpha 1–6 linkage), 96% and 4% respectively. Carbohydrates can be absorbed only as monosaccharides, therefore digestion is necessary to reduce all carbohydrates to this common denominator.

Digestion

Upon ingestion, starch and glycogen are initially exposed to salivary amylase, but only to a minor degree. Most enzymatic activity is derived from pancreatic amylase, resulting in the formation of oligosaccharides, maltose, isomaltose and some free glucose.

Ingested disaccharides, sucrose and lactose, along with the maltose and isomaltose that were formed from starch and glycogen, are then acted upon by specific disaccharidases located on the surface (brush border) of the mucosal cells lining the small intestine.

Absorption

Once in the free state the monosaccharides, glucose, galactose and fructose can be absorbed. Glucose and galactose compete for the same carrier system which is sodium dependent, requires energy and involves a sodium pump. Fructose, on the other hand does not require active transport and is not dependent on the glucose-galactose system. The exact mechanism for absorption is unknown but appears in part to be passive diffusion.

Abnormalities of Digestion and Absorption

Salivary Amylase: A total absence, whatever the cause, has no measurable effect on the state of digestion.

Pancreatic Amylase:

Congenital: To date no isolated lack of amylase has been described.

Acquired: Pancreatic disease, of various etiologies, usually results in mixed absorption abnormalities, including deficiency of amylase, lipase, and trypsin.

Disaccharidases

Sucrase-Isomaltase Deficiency

Congenital: Although only one case of pure sucrase deficiency has been reported, there have been numerous case reports of combined sucrase-isomaltase deficiency. These infants develop diarrhea when sucrose is added to their diet. An isolated isomaltase deficiency would create a minor problem since only 4% of starch is composed of this substance.

Acquired: There are some reports in the literature of adults developing sucrose intolerance, at times coupled with isomaltase deficiency. This may well represent late manifestations on a genetic basis; it could also represent acquired deficiency. Entities causing mucosal damage will also cause a decrease in all disaccharidases.

Lactase Deficiency

Congenital: There are two syndromes with congenital lactase deficiency: those with lactosuria (Durand's Syndrome) and those without (Holzel's Syndrome).

Acquired: Some of the acquired deficiencies may actually be late manifestations on a congenital basis. This possibility is supported by the marked racial differences: 70% of American negroes have low mucosal lactase levels while only 5–10% of American caucasians have this abnormality. To cloud the issue further some patients are intolerant to lactose (milk), but have normal lactase levels. Some authors have interpreted this to reflect an allergic response. Lactose intolerance has also been associated with other disease states such as ulcerative colitis, sprue, celiac disease, bowel resection, gastrectomy and blind loop syndrome.

Symptoms of lactose intolerance, or for that matter any disaccharide intolerance in its classical form, consist of borborygmi, abdominal discomfort, cramps or pains and watery diarrhea. The unabsorbed disaccharides are fermented by the colonic bacteria to organic acids of low molecular weight such as lactic and acetic acid, which are both irritating to colonic mucosa and cause a marked osmotic diarrhea.

Tests for Defects in Digestion and Absorption of Carbohydrates

Starch Tolerance Test: The purpose of the test is to evaluate the amylase activity of the pancreas by noting a rise in blood glucose after starch ingestion. In the proper hands the starch meal test is capable of demonstrating amylase deficiency.

Disaccharide Absorption Tests: Tests for *Sucrose, Maltose, Isomaltose* consist of elimination diets, tolerance tests and enzyme assay levels of mucosal tissue. Clinical tolerance tests are performed by ingestion of 50gms of the disaccharide in question, followed by blood sugar determinations over a two-hour period. A flat blood glucose curve reflects malabsorption.

Lactose: There are several ways to test for lactose intolerance; clinical trials, lactose tolerance tests and assay of mucosal lactase levels.

Clinically the easiest test is to give 50gms of lactose (one liter of milk) and observe for diarrhea and intestinal cramps. Acid stools are also frequently present. This test like the lactose tolerance test provides only presumptive evidence. In the lactose tolerance test, 50gms of lactose are ingested and blood sugar determinations are performed. A rise of less than 20–25mg% suggests lactase deficiency. Another way of testing is to have the patient ingest 25gms of lactose with 120ml of barium sulfate and note abnormalities of intestinal transport by fluoroscopy. A positive test reveals dilution of the contrast medium and rapid transit, with barium reaching the colon within 60 minutes.

Monosaccharide Malabsorption: This series of tests is based on tolerance tests to glucose, galactose and fructose.

Xylose

Although not a monosaccharide in the diet and not of any nutritional value, Xylose, a pentose isomer, is handled in a similar manner to glucose and has become one of the more important agents in the diagnosis of malabsorption. Twenty-five gm of Xylose in 250cc of water is utilized in the standard test. Normally within 5 hours 80–95% is excreted in the urine. Excretion of less than 20% (5gm) suggests malabsorption. Blood levels can also be determined, but urine evaluation is easier and at times more satisfactory. Conditions such as ascites and renal disease must be considered before proper evaluation can be complete.

Protein

The average American diet consists of approximately 70–100gms of protein, derived from animal and vegetable sources, and found mainly in the form of peptides with very little in the free amino acid state. It is usually assumed that the protein ingested is used for replacement of degraded proteins or anabolic needs and not caloric needs. One gram of protein/kg/day is adequate for nitrogen balance; however, if essential amino acids are well balanced, 0.5gm/kg is probably adequate. Therefore the requirement for protein is not only quantitative but also qualitative. Of the 20 amino acids in the diet, eight are considered essential or indispensable, since they cannot be synthesized by the body.

In order to maintain positive nitrogen balance there must be adequate digestion and absorption of the ingested protein. Most protein is absorbed in the form of amino acids but there are several exceptions which include certain dipeptides, colostric proteins, clostridial toxin and maybe some fractions of incompletely degraded protein responsible for food allergies.

Digestion

The object of digestion is to degrade the protein ingestion into the constituent amino acids so that absorption can occur. The first contact with digestive enzymes takes place in the stomach. Chief cells secrete pepsinogen which is converted in an acid medium to the active form, pepsin. Approximately 15% of the protein is converted to amino acids at this level. Longer digestion does not significantly increase the available amino acid yield, thus it is assumed that only certain bonds are degraded by pepsin. The products of digestion are then exposed to the digestive enzymes secreted by the pancreas. In an alkaline medium the trypsinogen and chymotrypsinogen from the pancreas, acted upon by enterokinase from the intestinal lumen, further degrade the protein to proteoses and peptones. The final cleavage of peptide linkage is accomplished by aminopeptidases, carboxypeptidases and dipeptidases.

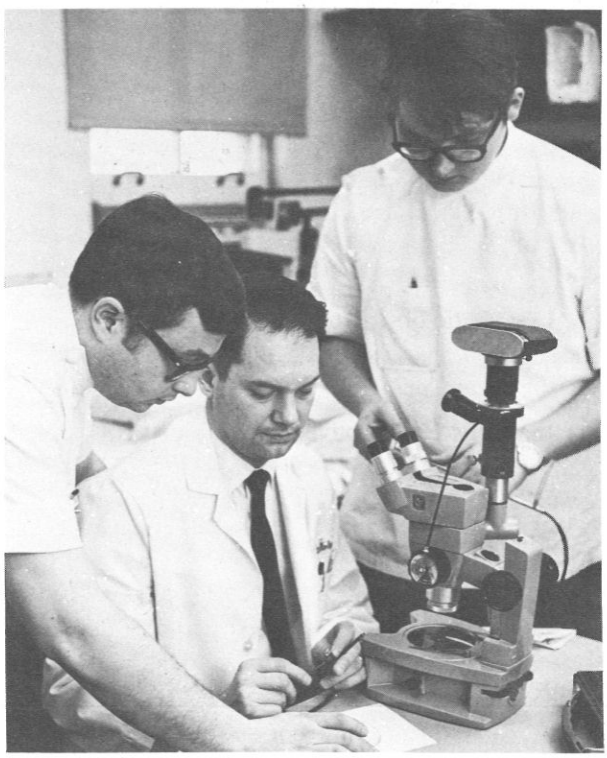
Absorption

After the proteins have been converted to amino acids they are capable of becoming absorbed. The majority of the amino acids are absorbed in the duodenum. The process is one of active absorption, energy-requiring and sodium dependent.

Specific transport systems exist for different groups of amino acids, including neutral amino acids, dibasic amino acids, and the imino acid and glycine group. As mentioned above, a small percentage of protein is absorbed in a form other than that of amino acid.

Primary Defects in Digestion and Absorption

In review of the literature, only a few cases are described which demonstrated isolated deficiencies of pepsin, trypsin, or the intestinal dipeptidases. There are several inborn errors of metabolism which in-



CDR Gerald Roling, First Year Fellow in the Gastroenterology Program, prepares a small intestinal biopsy for viewing under the dissecting microscope. Assisting are HM3 David Snyder (left) and HM3 Michael Rans (right).

Table I: Diseases Possibly Associated With Malabsorption

Etiology	*Disease State*
Inadequate digestion	Gastric resection
	Pancreatic insufficiency
	Liver and biliary tract disease
Biochemical abnormality	Disaccharide deficiency
	Monosaccharide intolerance
	Abeta-lipoproteinemia
	Cystinuria
	Hartnup disease
	Celiac disease (gluten enteropathy)
	Diabetes mellitus
	Hypo- and agammaglobulinemia
Altered gastrointestinal mucosa	Pernicious anemia
	Regional enteritis, ileojejunitis
	Lymphoma
	Amyloidosis
	Radiation injury, radiomimetic drugs
	Neomycin and other drug effects
	Acute enteritis
	Parasitic infestation
	Skin disorders
Altered bacterial flora	Jejunal diverticula
	Blind loop, afferent loop obstruction
	Stricture, fistula
	Tropical sprue
	Scleroderma
Lymphatic obstruction	Intestinal lymphangiectasia
	Whipple's disease
Inadequate absorptive surface	Intestinal resection
	Intestinal bypass
Alterations in motility	Vagotomy
Endocrine	Carcinoid syndrome
	Adrenal insufficiency
	Hypoparathyroidism
	Hypothyroidism
	Pancreatic adenoma
Vascular	Congestive heart failure
	Constrictive pericarditis
	Mesenteric artery insufficiency

volve defects of amino acid transport across the mucosal lining of the gastrointestinal tract. In many instances these defects are coupled with renal tubular abnormalities. The more common examples are cystinuria in which there is abnormal renal and intestinal handling of cystine and the dibasic amino acids, lysine, arginine, and ornithine; Hartnup disease with renal and GI involvement of tryptophan transport; and methionine malabsorption.

Secondary Deficiency States

Disease states associated with inadequate digestion, altered gastrointestinal mucosa, altered bacterial flora, and lymphatic obstruction are capable of causing decreased protein absorption.

Investigative Procedures for Deficient Protein Digestion and Absorption

In the study of malabsorption, protein evaluation is most difficult and not altogether satisfactory from a clinical viewpoint. Stool examination for meat fibers, fecal digestion of gelatin, labeled macromolecules such as I^{131} albumin, I^{131} PVP, Cr^{51} albumin, fecal nitrogen determinations, serum electrophoresis, amino acid tolerance tests, and gelatin tolerance tests have all been introduced in an effort to aid in the assessment of malabsorption. Unfortunately none of the methods have withstood the test of time in offering the clinician a reasonably reliable test.

Other studies apart from those directly connected with digestion and absorption that may be of greater significance in the study of malabsorption include intestinal biopsy, bacterial cultures of the small bowel, duodenal drainage, and immunoglobulin levels (especially IgA) in intestinal secretions.

A Workable Classification

There are numerous ways to approach the problem of malabsorption. In reviewing the literature no classification was considered to be all-inclusive, but the one of Weser, Jeffries, and Sleisenger (Gastroenterology 50: 811, 1966) offered a practical outline and is included here (Table I). The references selected should provide a rational perspective for the clinician when faced with the problem of suspected malabsorption.

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ABSTRACT PAPERS

DESIGN FOR A HUMAN PULP STUDY, PARTS I AND II

Harold R. Stanley, DDS, BS, MS, Oral Surg 25(4): 633–647, April 1968 and 25(5): 756–764, May 1968.

Studies of human pulp responses to various materials must be standardized in order that results can be compared. Some criteria for such studies are suggested, although it is recognized that clinical difficulties can prevent their realization. They are as follows. (1) Only persons who can contribute two or more teeth should be accepted. To minimize the biologic variation in pulp response, a sufficient number of samples are needed, and experimental control teeth should be comparable with respect to average age of patients and average tooth size. (2) Zinc-oxide and eugenol should continue to be used as the control restorative material. (3) All cavities should be prepared at the same sitting, the remaining dentin thickness being no greater than 2.0 mm. and as nearly uniform as is humanly possible. (4) If only two teeth are available, one should be filled with zinc oxide and eugenol and the other with one of the test materials. If three or more teeth are available, two or more test materials may be used, but there should be more controls than test specimens for each material. (5) Comparisons should be restricted to teeth extracted at the same sitting. (6) Extractions should be performed, as nearly as possible, at stated intervals, for example, on the second, seventh, twentieth, fortieth, and one hundredth days. This will reduce the needed sample size; if this cannot be done, a larger sample will be needed to compensate. (7) As in previous studies, determinations should be based on the section with the least remaining dentin thickness. (8) Statistical analysis should be conducted for the validity of differences on a sequential basis (matched pair

differences), and for the degree of effect, first, on the numbers of persons with adverse reactions in a given time interval (numbers are better than averages from the clinical point of view because of differences in responses); and second, using averages to determine trends, on the extent of difference, and probable eventual outcome.

In histopathological study, sections with the smallest remaining dentin thickness are used. Pulp responses are graded by the intensity of cellular displacement into the dentinal tubules and degree of inflammatory response in the superficial and deeper pulp tissues. The predominant type of inflammatory cell should be noted, and also the incidence of abscess formation, foci of necrosis, eosinophilic staining, regeneration of odontoblasts, and reparative dentin formation.

(Abstract by LCDR R. A. Murphy, DC, USN.)

THE ORAL MANIFESTATIONS OF DIABETES MELLITUS, A REVIEW

Richard F. Mascola, DDS, New York Dent J 36(3): 139–142, March 1970.

The classical oral subjective and objective symptoms that may indicate the presence of diabetes are dry or burning mouth, gingival tenderness, pain on percussion of all teeth. In the uncontrolled diabetic there may be, in addition, generalized hyperemia and edematous mucous membranes, loss of filiform papillae of the tongue and an increased incidence of dental caries. There is general agreement among investigators concerning periodontal involvement and alveolar bone loss in the uncontrolled diabetic. However, there is not this same agreement concerning the increase in caries incidence. Studies vary and reported findings range from no increase to a pronounced increase. With an increase in blood sugar levels it has been shown that the glucose content of the serous saliva of the parotid gland increases. This viscous fluid coupled with the soft diet associated with debilitated oral environment may well cause an increase in dental caries. Exacerbation of dental infection may throw a well controlled diabetic patient out of control. Since a dental emergency may rapidly precipitate a medical emergency, it is most important that dental and periodontal health be established and maintained. With further progress in comprehending the pathogenesis of diabetes, the complications may also be better understood. Early recognition, control, and appropriate therapy constitute the best available measures for managing the oral manifestations of diabetes mellitus.

(Abstracted by Captain George H. Green, DC, USN.)

GLUCAGON AS A HEART STIMULANT

An explanation for the disappointing results obtained with the heart stimulant, glucagon, in the treatment of patients with chronic heart failure was provided recently by Drs. G. S. Levey, K. H. Prindle, and S. E. Epstein, of the Cardiology Branch, National Heart and Lung Institute.

Their studies, reported in Atlantic City at the meeting of the American Society for Clinical Investigation, indicate that although glucagon substantially improves the pumping performance of normal or nearly normal hearts, it does not benefit failing ones.

A hormone from the pancreas, glucagon's chief physiological function appears to be the mobilization of metabolic fuels as needed to meet the energy requirements of the body's organs and tissues. The hormone 1) stimulates the breakdown of glycogen, the complex carbohydrate stored in liver and muscle, to yield glucose; and 2) stimulates the breakdown of triglyceride (neutral fat) stored in adipose tissues, to yield free fatty acids that sustain the organism during periods of fasting.

More recent observations that glucagon also increased heart muscle contractility and improved its pumping performance suggested that the hormone might be useful in treating chronic congestive failure, but it has failed to perform up to expectations in clinical trials.

Glucagon does not work, the NHLI scientists report, because it cannot increase the production of a substance called cyclic-AMP in the failing heart.

Cyclic-AMP appears to be the essential middleman in the action of a number of hormones. The primary action of the hormone appears to be to increase cyclic-AMP production in the susceptible organ or tissue. It is the cyclic-AMP that actually carries out the hormonal directive.

For example, when norepinephrine is infused into the heart, heart rate goes up, the vigor of individual contractions increases, and the amount of blood pumped over a given period rises; ergo norepinephrine is a cardiac stimulant.

It is not quite that simple, however, for when norepinephrine is infused into the heart, it actually increases the activity in human muscle fibers of an enzyme called adenyl cyclase. Adenyl cyclase catalyzes the production of cyclic-AMP from adenosine triphosphate (ATP), the immediate source of chemical power for all energy-consuming bodily processes. As heart-muscle concentrations of cyclic-AMP rise, so also does heart performance. Having done whatever it does to bring all this about, the cyclic-AMP is subsequently inactivated by another enzyme present in the heart called a phosphodiesterase.

The mechanism by which cyclic-AMP brings about the diverse effects of various hormones in various tissues is not known; but both the duration and intensity of the hormone's action on susceptible tissues appears to be directly related to the cyclic-AMP concentration that is induced in that tissue by the hormone.

Glucagon induces increased cyclic-AMP production in normal heart muscle and thereby augments heart performance. For reasons not yet clear, glucagon is impotent to increase cyclic-AMP production in the failing heart (although it remains as effective as ever in liver and other glucagon-sensitive tissues), hence is also impotent as a cardiac stimulant in chronic congestive heart failure.

The enzymatic machinery for producing cyclic-AMP is still present in the failing heart—and it responds to other cardiac stimulants, such as norepinephrine—but not to glucagon.—HEW News Release, May 7, 1970.

PIONEER MEDICAL REGULATING CENTER CEASES OPERATIONS

On 10 April 1970 the Navy-Marine section of the I Corps Joint Medical Regulating Center in DaNang ceased operations. Dedicated on 18 April 1969 by VADM G. M. Davis, MC, USN and MGen H. Jennings, MC, USA, the combined Army-Navy-Marine facility controlled patient distribution and movement throughout the I Corps zone of operations. Inauguration of this facility marked the first time a joint regulating center for primary evacuation control was employed in a combat zone.

"Medical regulating" is a traffic management system which matches patients against available resources. Such a system becomes essential when multiple treatment facilities are available. "Primary regulating" is the distribution control of battlefield casualties; "secondary regulation" is the control of their subsequent distribution to other medical facilities—including Continental United States—after initial definitive care.

Because of differences in operational doctrines on helicopter control, span of medical command, chains of command, and assigned communications nets, it was not possible to establish a truly "joint" medical regulating, or casualty evacuation control center in I Corps. The most feasible alternative was selected—separate Navy-Marine and Army sections working side by side in the same bunker with patient load and distribution boards easily visible to each group. In this way decisions on "cross-servicing," when required, could be quickly made.

Combined Center

The combined center was located in a heavily reinforced bunker at the headquarters of the 67th U.S. Army Medical Group, the senior echelon of Army Medical Command in I Corps. The facility was constructed by Navy CB's. Previous to this time a Navy section had conducted limited operations at NSA Hospital. The operation at NSA Hospital clearly demonstrated a requirement for medical regulating of Marine battle casualties and for a more definite span of control and assigned communications links. Similar requirements had been evident for some time to the Army, and appropriate doctrine, equipment and personnel had been developed and incorporated in the Army Field Medical Service. Medical regulating for the Army section presented fewer organizational problems than for the Navy-Marine section since the 67th Group Commander exercised command over the entire chain of Army hospitals in I Corps as well as the Army air and ground ambulance services and medical supply resources. No such span of medical command exists in the medical support system for deployed Marine Forces; however, an agreed "coordination" doctrine was finally evolved which permitted effective casualty evacuation control. Lessons learned during the 11 months' operation of the center have led to a series of conferences on increased medical communications for USMC units with a strong likelihood that the increases will be effected. Similar consideration of Amphibious Force requirements will be

effected at a CNO-sponsored seminar in August 1970.

Evacuation Control

Casualty evacuation control of USMC casualties was effected as follows:

1. A call for medical evacuation was passed via tactical networks to the appropriate Marine Helicopter Direction Center and a pickup was arranged—either by the duty med-evac helicopter "package" or by diversion of a nearby helicopter from its logistic mission.

2. After pickup was effected, the pilot called the Navy-Marine regulator on an assigned FM channel ("Medevac Common"), informed him of the number and urgency of his embarked patients and requested a destination. Special categories such as head and eye wounds were also reported.

3. On the basis of his status boards, the regulator would select the facility most capable of handling the patients at that time and so inform the pilot.

4. All casualty receiving facilities ashore monitored this network, but to ensure that they were alerted, regulating personnel would place direct calls via other radio links or land lines to the hospital concerned.

5. Additionally, the pilot, as he came within radio range of the receiving facility, would communicate directly. Because of the fact that any Marine helicopter was available for the ambulance mission, pilots were frequently unfamiliar with the precise locations of medical receiving facilities, in which case the regulator would relay the information. This was particularly true if the destinations were Vietnamese civilian or military hospitals (for patients in these categories).

An indication of the activity of the regulating section may be gained from the statistical records: 5894 helicopter loads were regulated, carrying 17,311 patients direct from the site of battle during the 11 months of operation.

Primary Regulating

Because of communications limitations, primary regulating for Northern I Corps (3rd Marine Division) was delegated to the 3rd Medical Bn. Similar loads were processed by that office. The function was less complicated in this area because fewer receiving facilities were available.

Two principal problems were encountered:

(1) Communications difficulties. Communications between helicopters in Southern I Corps and the center were generally excellent, but communications between the center and some receiving facilities were not always reliable. Communication by wire often broke down, even though direct "hot" lines were installed. Radio communications with hospital ships operating off Northern I Corps were sometimes unsatisfactory and direct rapid communication with casualty receiving ships of the Amphibious Ready Groups was often difficult. "Secure" (automatically encoded) circuits were not available to the regulator; if a requirement was placed on the regulator for "secure" transmissions, relay through III MAF was required, with delay of about 15 minutes for courier travel. Direct, rapid communication with Vietnamese army or civilian hospitals was frequently impossible due to VN shortages of equipment and translators.

(2) Failure to incorporate ground ambulances into the system. The regulator depended principally on twice daily hospital reports plus his cumulative status boards for knowledge of the patient receiving capability of the various facilities. Interim up-dates were passed at crucial points (i.e., "4 hr. surgical backlog" etc.). However, since only a few Marine ground ambulances were radio-equipped, and since the NSA ambulance net could not be continuously monitored, there were times that patient loading at facilities would reach levels of which the regulator was unaware. Occasionally it was necessary to redirect helicopters to other facilities. While this rarely caused much delay, the ever present possibility of a serious accident or attack in the DaNang area, with ground ambulance evacuation of large numbers of surgical casualties, could have led to serious local overloading. Several episodes occurred which clearly indicated this potential danger.

Secondary Regulating

The scheduling of patients for onward evacuation from I Corps to hospitals in Japan, Guam and Continental United States was an equally important function of the regulating center. When the system became fully operational, patients could be informed of their next hospital destination before they left Viet Nam. This greatly facilitated the early receipt of personal mail for the patient, as well as permitting completion of records for transfer by the initial facility. Daily consolidated requests for patient movement were submitted to the Area Joint Medical Regulating Office in Saigon. Through direct communication with the Pacific Command Joint Medical Regulating Office and the Armed Services Medical Regulating

Office (Washington), the Saigon office maintained a running tally on available beds by specialty and facility for the entire Pacific Ocean Area and Continental United States. A patient was thus programmed for a specific bed—with the proper specialty care available, and closest to his home, if he was sufficiently stable for evacuation all the way to the United States. Confirmation of destination was almost routinely available within an hour after the consolidated request was submitted. The regulator then made arrangements to move evacuees from each primary receiving facility to the USAF 22nd Aeromedical Staging Facility at DaNang airfield for preflight preparation and processing. Normally the patients were delivered on the afternoon prior to flight; seriously ill patients could be retained at the primary receiving facilities and delivered just prior to flight time.

Another aspect of "secondary" regulating was the movement of patients among the various facilities in Viet Nam, for a variety of reasons—transient overloads, impending operations, special treatment, etc.

During the 11 months of operation the Navy-Marine section of the Center arranged 3406 in-country movements; 11,263 evacuations to hospitals in the Pacific Ocean Area; and 1003 direct evacuations to Continental United States.

The establishment of this facility greatly improved the smooth and orderly flow of casualties to the facilities best able to care for them. LT P. R. Patterson, MSC, USN, was the Officer in Charge for the entire period. LTJG W. E. Roberson, MSC, USN, served as his assistant. Generally five enlisted HM's comprised the staff with HMC J. C. Hampton, USN, as senior petty officer. They quickly became competent in manning the various communication circuits. Maintenance and repair, of course, was outside their capability; this service was provided by the III MAF Communications and Electronics Staff Officer.

Future Application

The requirement for an organized system of patient distribution in support of USMC field operations of substantial size has been made apparent by the success of this pilot endeavor. A satisfactory interface with the casualty evacuation control system of Amphibious Forces remains to be worked out, as does passage of casualty evacuation control from sea to shore. Control concepts practiced during the major amphibious exercise "Exotic Dancer III" are now being analyzed. An interface system with U.S. Army Regulating Offices must also be worked out for those joint operations in which collocation of the Navy-Marine and Army regulating sections might not be feasible. A requirement for trained teams of regulators for contingencies is also apparent. Consideration is being given to enlarging the mission of the present Casualty Evacuation Teams to include Casualty Evacuation Control. Resolution of the problem of secure transmissions in unfriendly electronic atmospheres is in sight.—Code 75, BuMed.

Over the years numerous civilian hospitals, consultants, engineers and other professional people have called the author of this article for plans, specifications, sources, ideas and principles in construction of therapeutic pools. The Naval Hospital, Philadelphia, Pa., recently completed a therapeutic pool; however, it is believed that this article will benefit many doctors, physical therapists and Hospital Corps therapist technicians throughout the service.

PLANNING AND CONSTRUCTING A THERAPEUTIC POOL

By CDR Georgia M. McKearly, MSC, USN, Head, Physical Therapy Department, Naval Hospital, San Diego, California

Construction of the first Therapeutic Pool in the Navy began in 1963 at the Naval Hospital, San Diego, California, and was completed in April 1964. Since that time numerous requests for information regarding planning, construction and administration of such a facility have been received from other Naval Hospitals and civilian activities. It is hoped that the following information will be of help to those undertaking such a project.

Funds allotted for construction of the pool were part of a bequest made to the Navy from the estate of the late LCDR Paul E. McDonnold, MC, USN,

Ret. The gift amounted to $22,650.00. Public Works was responsible for remodeling the space selected for the new facility and awarding of the contract to a civilian concern for construction of the pool and the installation of a hydraulic lift.

Choice of available space was limited in order to meet the basic requirements for installation of this new treatment facility, i.e. structural adaptability, adjacent to or within the Physical Therapy Department and easy accessibility. The cost of remodeling the area and the actual construction of the pool also had to be considered in order to keep within the set budget. The Chief of Physical Medicine and Rehabilitation Service and the Head Physical Therapist acted in an advisory capacity throughout the construction of the pool and subsequent remodeling.

Construction and Maintenance

The site selected was within the Physical Therapy complex and, of necessity, the dressing rooms, showers and rest room had to be located in the same area as the pool. This has proven to be satisfactory and permits better utilization of personnel and space. The pool is 30 feet long and 15 feet wide with a plaster and tile surface. There are three depth levels of 2 feet, 3½ feet and 5 feet, with a step-down rather than graduated slope at these levels (Fig. 1). Level areas provide greater stabilization for exercising patients, placement of treatment plinths and ambulation training.

Maintenance of the filtration, chlorination and temperature regulating systems of the pool is performed by personnel assigned by the Public Works Division. Temperature of the water is maintained at 97° and the pool is checked twice daily for proper chlorination and pH (acid-alkaline balance of the water). We began draining the pool every three months after our first 6 months of operation when it was noted that the staff working in the pool began experiencing irritation of their skin. An analysis of the water at the end of 3 months revealed a marked increase of chloride ion content. The pool is operated 4½ days per week, allowing one-half day for general maintenance of the entire facility.

Equipment

a. Exhaust fan to control humidity.

b. Hydraulic lift with stretcher at the 3½ foot depth—prime piece of equipment.

c. Electric hoist at the 5 foot depth with an overhead beam extending 10 feet above pool—used as an auxiliary lift.

d. Hand rails (9)—installed 4 inches below the water line at either end and both sides of the pool.

e. Chrome ladders (3) with supporting hand rails—one located at 5 foot depth and two at the 2 foot level.

f. Air jets (6)—distributed along sides of pool walls.

g. Safety ropes and floats—across pool at step-down levels.

h. Exercise plinths (2)—constructed from Hubbard Tank stretchers. These are covered with 2-inch plastic webbing and have one end fitted with metal hooks to fit over hand rails at side of pool. Adjustable metal tripods were constructed to support opposite end of stretcher with sufficient slant to allow maximum submergence of the body (Fig. 2).

i. Colson Hydrotherapy Plinth—56 inches long—adjustable stainless steel treatment table at 3½ foot depth.

j. Walking bars (2)—varnished wooden poles with diameter relative to the width of pool. A metal attachment was constructed on ends to hook over hand rails at the side of pool to secure bars. These are easily floated in and out of position and are used at any depth.

k. Inflatable rubber rings as necessary to support patient's head while receiving exercises on treatment plinths and to assist in ambulation.

l. Swim fins—in three sizes—used to give added resistance in exercise routines.

m. Guerney—kept in pool area to facilitate transfer of patients.

n. Wheel chairs (3)—used in pool area to transport nonambulatory patients to dressing rooms, shower and pool.

o. Bathing trunks—furnished to male patients.

p. Disposable waterproof slippers—provided to ambulatory patients for wear around pool area and in the shower as a sanitary measure.

Types of cases treated

Pool therapy is a valuable treatment modality useful in treating a variety of medical and surgical conditions, especially those of an orthopedic nature. Due to the buoyancy of the water many exercise routines can be executed in the pool which cannot be accomplished in other media. Acute cases are treated on a daily basis for an average of 20 minutes and those patients with chronic complaints are treated three

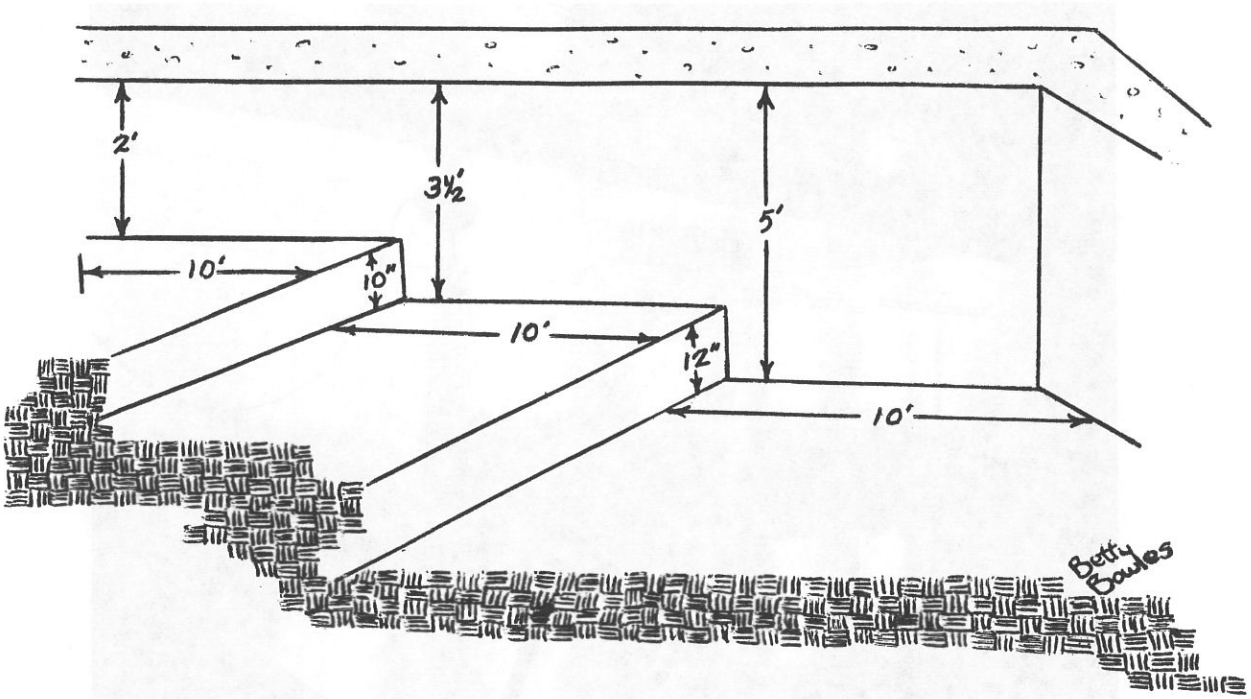


Figure 1. Step-down gradation at 2 feet, 3½ feet, 5 feet depths of pool.

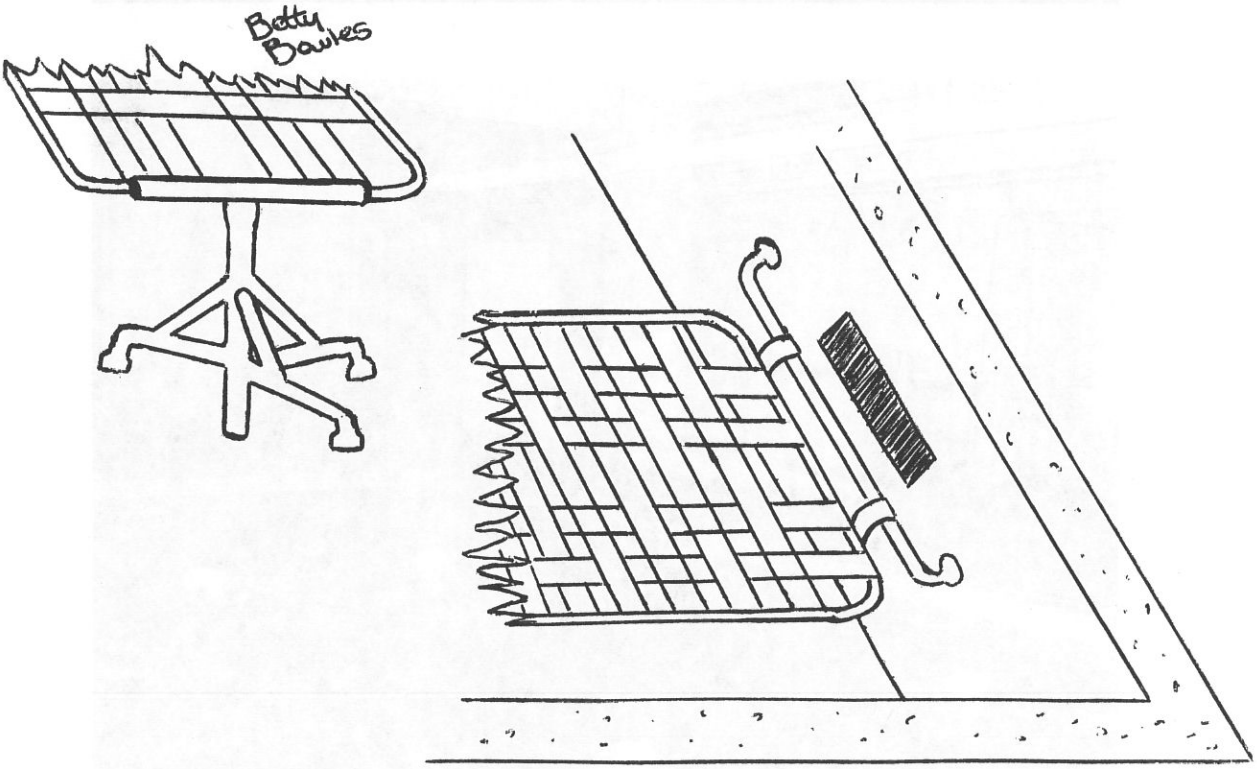
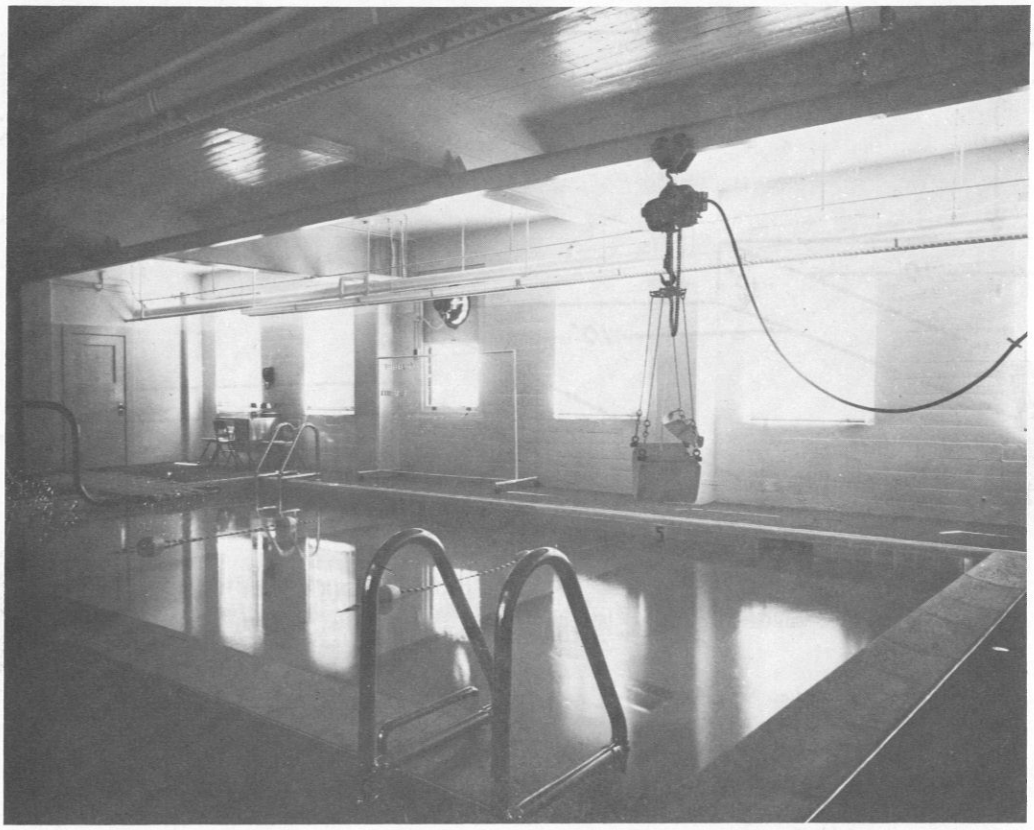
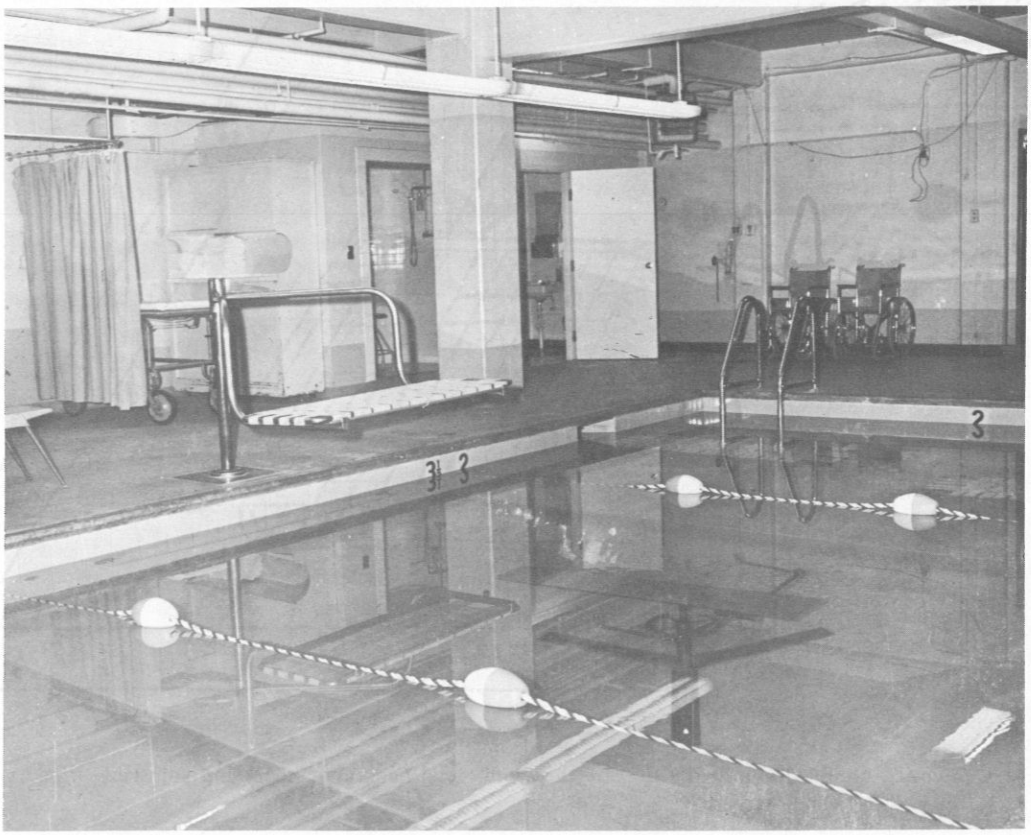


Figure 2. Modified Hubbard Tank stretcher with metal hook attachment and adjustable tripod.





times a week. Patients with open wounds are not accepted for treatment in the Therapeutic Pool.

Staff Assignment

When setting up assignments for therapists and technicians who treat patients in the pool certain criteria must be considered in view of the increased water temperature and average length of time these individuals must spend in the water, i.e. fatigue factor, imbalance in body chlorides and irritation to the skin. Depending on case load, two to three therapists and two to three technicians are assigned to the pool area.

Summary

There were few guidelines to follow in the planning and construction of the Therapeutic Pool. In order to determine the best method of operation, many clinical and laboratory studies were made over a period of time. After six years of continual use, 4½ days a week, treating an average of 60 to 70 patients per day, few changes and alterations have been required following the completion of the pool. During these years of successful operation our therapeutic pool has proved to be efficient, the maintenance uncomplicated and treatment results rewarding.

DENTAL CARIES RESEARCH *

By CAPT Gordon H. Rovelstad, DC, USN

Research in dental caries has been active for many years, oriented toward the chemoparasitic theory of dental caries postulated by W. D. Miller in 1882.[1] The role of microorganisms was controversial as was the mechanism for breakdown of enamel and dentin during the course of the disease. Factors in etiology that were well established in subsequent years, however, were bacteria, carbohydrates, and host susceptibility. It was not until the beginning of the 1960's that the role of bacteria in dental caries became clear and the disease was recognized as infectious and contagious. The sequence of events in studies is most interesting.

Fitzgerald and Keyes in 1960 were able to isolate from carious lesions in hamsters a number of closely related strains of streptococci that produced typical lesions of caries when inoculated into the oral cavities of caries inactive hamsters.[2] These investigators demonstrated that specific streptococci produced caries in hamsters, and that the disease could be transmitted from one animal to another by merely caging infected animals with non-infected ones.[3] Further, animal studies were performed which confirmed these findings in other test animals. Then Zinner and co-workers isolated streptococci from carious lesions in children that produced carious lesions in animals.[4] Krasse[5] and Gibbons[6] have reported that streptococci isolated from human carious lesions were able to produce typical disease in the teeth of rats and hamsters. Shklair isolated several strains of streptococci from plaque of naval recruits which produced caries when inoculated into germ free and gnotobiotic rats.[7] Thus, for all practical purposes, Koch's postulates have been satisfied in both laboratory animals and humans by several different investigators.

The microorganisms isolated in these studies had not been classified previously, having the ability to produce a polysaccharide, extracellularly, when grown in a sucrose enriched media. The polysaccharide appeared as a clear, water soluble, gelatine-like material around the colony and was later identified as a dextran, 1–6 linked glucose polymer.[8]

Thus for the first time, dental caries was linked to a specific infectious agent and consequently additional research extended this concept. Inasmuch as the primary work was conducted on animals, it became necessary to apply this research concept to human studies. The initial phase of the infection was yet to be identified and the relationship to dental plaque was unknown. The key to future prevention methods rests with the outcome of this research.

Host Susceptibility

Recent studies using the scanning electron microscope have well demonstrated that normal tooth structure has many sites for the localization of the initial infection. Studies of sound tooth specimens have shown that the terminal border of the imbrication lines of the enamel provide excellent sites for bacterial colonization and even for penetration to the

The opinions expressed herein are those of the author and cannot be construed as reflecting the views of the Navy Department or the Naval Service at large.

* Lecture for New Jersey Academy of Medicine, April 15, 1970, East Orange, New Jersey.

underlying enamel structure.[9] It has been demonstrated further that the initial action of acid on the enamel results in the demineralization of the enamel rod core area, whereas the action of EDTA results in the demineralization of the enamel rod sheaths.[10] Recently, it was demonstrated that proteolytic enzymes alone can bring about a deterioration of the enamel surface.[11] These studies point out the complexity of dental enamel.

Certainly patient susceptibility plays a major role in dental caries. The effects of fluorides in caries prevention is well known. The specific action of fluoride on the tooth surface in relation to dental plaque needs to be more fully understood. Although sufficient fluoride is present in plaque which, if in ionic form, could inhibit enzymatic action at the tooth surface, it has not been possible to demonstrate such inhibition.[12]

The clinical evidence continues to mount, however, with numerous studies over the past twenty-five years demonstrating the effectiveness of fluorides for the prevention of dental caries by increasing the resistance of the tooth.

It was recently reported that pit and fissure caries could be prevented by the application of an adhesive polymer to the occlusal surfaces of teeth. This concept in effect protects the most susceptible sites from bacterial infection. Future studies in this area will be of great interest.

Carbohydrates

The role of carbohydrates in dental caries has been known for many years. The relation of frequency of contact with the tooth surface as well as the relative stickiness of the sugar has been well established. Now research seems to be centering on those particular sugars which are significant to the production of dental plaque on the tooth surface.

Specific carbohydrates in the caries mechanism are of current interest because of the finding that sugar is necessary for cariogenic streptococci to form dextran. It has been confirmed that dextran formation is dependent upon the presence of sucrose in the media for the cariogenic streptococci.[14,15] Plaque formation may be dependent upon dextran or some other similar polysaccharide for its formation.

Bacteria

Much research is being conducted in relation to the cariogenic microorganisms. This has provided a vast amount of literature on the subject within recent years alone. Certainly, careful characterization and identification of the specific bacteria involved is of prime importance. Several different types have been isolated by different investigators. The common factor among them is that they produce an extracellular polysaccharide, and when tested in animals, produce dental caries. The fact that human cariogenic microorganisms have been isolated and used to infect animals and produce caries suggests that there is a great similarity of the disease among different species. This further suggests that animal experiments can be very closely related to human studies and therefore to developing methods for application to the prevention of dental caries in humans.

Recent reports have added to the knowledge of the cariogenic microorganisms, describing their morphology,[16] proteolytic activity,[17] other biochemical activity,[18] molecular structure,[19] and immune characteristics.[20] Three different types of disease seem to be involved, i.e. caries of enamel smooth surfaces, caries of enamel pits and fissures, and caries of cementum. There is speculation that each of these types of caries is due to a different type of microorganism. The relative importance of lactobaccilli, streptococci, Leptothri and others as etiologic agents in dental caries is of great interest.

The accumulating data relating streptococci to dental caries has resulted in a number of studies directed toward the inhibition of bacteria in order to control dental caries. The evidence that dextran is related to the formation of dental plaque by cariogenic streptococci has resulted in a series of studies which have attempted to prevent the process by using dextranase, an enzyme that degrades dextran. The topical application of this enzyme to the tooth surface by one means or another has been a sound approach to the control of animal dental caries.[21] However, the results have not been conclusive in humans. No measurable differences in plaque scores have been shown, consistently, between groups of subjects using a dextranase mouthwash and those using a placebo mouthwash.[22] Other studies have shown that less deposit is formed during the period when a mouthwash containing dextranase is used.[23]

Studies demonstrating elevated antibody levels against cariogenic streptococci have led to investigation of immunization as a means of preventing caries. The first study in which a group of animals were immunized successfully against dental caries was reported in 1967.[24] Others have been reported since.[25] Conventional methods for immunization against infectious disease may not be applicable to the

prevention of dental caries.[26] However, immune response of oral microflora has been demonstrated in both animals and humans.

Summary

Dental caries is recognized as an infectious disease which attacks the teeth. The initial infection occurs early and, if untreated, results in damage to the tooth structure and eventually cavity formation. Prevention methods in current use relate to control of sugars, adequate oral hygiene and use of fluorides. These approaches have been directed at decreasing host susceptibility and availability of sugars in the environment of the teeth. The most promising effort in research today involves specific infectious agents. Prevention technics based on preventing the initial infection will complement existing methods in wide use today and provide a more effective service to the public.

Certainly there are many current procedures at hand that can help prevent dental caries. These are sound and practical, and are being widely used. The most that can be expected however, is a 50% to 70% reduction of new caries. With new technics based on current research it is hoped that dental caries can be completely prevented in the future.

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HEALTH CARE SEMINAR—At the invitation of the Surgeon General, U.S. Army, VADM G. M. Davis, MC, Chief of Bureau, attended the annual seminar jointly sponsored by the Army and Baylor University. This year's meeting was held at the Army Medical Field Service School, Fort Sam Houston, Texas, 6–10 April. Dr. Louis M. Rousselot, Deputy Assistant Secretary, DoD (Health Affairs), made the keynote address. Admiral Davis was accompanied by CAPT E. L. Van Landingham, MSC, Chief of the Medical Service Corps, and LCDR N. L. Peckenpaugh, MSC, Aide to the Surgeon General. The general subject of the seminar was "Health Care Goals and the 1970's—Perspectives for Administration."

ARTHROPOD SYMPOSIUM—Hosted by the Naval Medical Research Institute (NMRI) at the National Naval Medical Center, Bethesda, Md., a "Symposium on Arthropod Cell Cultures and Their Application to the Study of Viruses" was held on 17–18 March 1970, honoring the late Department of Microbiology staff member, Dr. Earl C. Suitor, Jr. Many noted scientists from universities and research institutes around the world presented approximately 40 papers during the two-day meeting. Arthropod cell culture techniques have shown marked progress which should lead to future development of improved vaccines, better diagnostic and epidemiological techniques, and new concepts for control of insect vectors without the disadvantages of environmental pollution associated with use of chemical insecticides.

Nineteen Nurse Corps officers recently attended a short course in Pediatric Nursing at the Naval Medical School, National Naval Medical Center, Bethesda. The program, sponsored by the Bureau of Medicine and Surgery, was designed to update the concepts and practices in the health care of children.

The following paper on the Hospitalized Preschool Child was the result of a group project conducted during the course. The authors are LCDR Jean Weiss, NC, USN; LT Shirlee Hicks, NC, USNR; LTJG Sandra Busam, NC, USNR and LTJG Linda Hicks, NC, USNR.

CDR Katherine Wilson, NC, USN and CDR Alicia M. Foley, NC, USN were the group directors.

A DISCUSSION ON THE HOSPITALIZED PRESCHOOL CHILD

From the Pediatric Conference, Naval Medical School, NNMC, Bethesda, Md., 1970.

The Normal Preschool Child: Emotional Development

The preschool child wants to learn what he can do for himself. He has an active imagination. He imitates adult behavior and wants to share in such activities. Although he cannot really participate in the adult world, he pretends that he can.[1]

The child learns quickly that different materials are suited to specific purposes. He understands language well enough to communicate through speech. This increases his ability to learn from the experiences of others and to understand much that he has not personally experienced. He begins to ask questions that show that he is beginning to think in terms of the abstract and to understand things he cannot see or touch.[2]

Between the ages of three and six years, the little girl becomes more interested in her father. The little boy becomes possessive of his mother. Children feel some aggression toward the parent of the same sex, but usually keep their feelings hidden.[3]

The preschool child needs security and independence. The child needs assurance that he is wanted, loved, and enjoyed by his parents; he needs a stable home in which he can always count on his parents' presence, and in which his needs are met.[4]

As the child grows, he needs and wants some controls and limits. He must be taught to use these controls in achieving behavior acceptable to his stage of development.[5]

Fear in children is an emotional response either to the unknown or to an unpleasant experience that may be repeated but is not understood. Since a child's world of experience is relatively small, it is extremely difficult for him to bring the intangibility of the unknown into the realm of the tangible "known". This circumscribed world of experience also accounts for the child's limited understanding, since understanding is also an intangible process that takes place only through experience.[6]

Several causes of anxiety are common during the preschool period. Specific causes of fear are intensified by the peculiar combination of anxiety-producing circumstances which occur during hospitalization.[7] The child may fear being deserted by his parents, feeling that they no longer love him or that he is being punished for misdeeds or thoughts which he should not have had. He has a great fear of pain and physical injury. The frightened child needs reassurance in order to gain a feeling of safety.[8]

The degree of severity of the effects of separation and the types of reactions seem to stem from the same basic influences; the age of the child at the time of the separation, the child's early family life experiences, the attitude of the child's family toward the child and toward the cause of the separation, and the amount of separation.[9]

A preschool child has not quite developed an understanding of terminal disease and death. In adulthood intellectual concepts serve to develop an understanding and allow the adult to face the psychic pain of death. Children perceive death as "someone who has gone away and will never come back again".[10]

Hospitalization of the Preschool Child

A preschool child in the hospital is confronted with countless new impacts, frightening sights and sounds, unfamiliar equipment, odors and people. Regardless of how well the child has been prepared for his hospital experience, the actual situation will likely be quite different from his own mental picture of it. His senses vividly take in the world about him through sight, touch, smell, hearing and taste. His senses are keenly alert to new stimuli. Being admitted to the hospital may be frustrating to the child.[11]

The degree to which a preschool child responds to acute illness with anxiety and fear depends on the extent of parental anxiety and on how well he has been prepared by previous experiences of separation. Parents are not able to hide their anxiety completely, and a complete denial of it confuses the child. The parents should master their anxiety by a full understanding and acceptance of the situation. Only then can they build up confidence and courage in the child himself.[12]

It is important first of all to help the parents handle their own anxiety and then, with their aid, to assist the child in facing reality, understanding and accepting the imposed illness, and maintaining normal interests in spite of the distraction caused by illness. The nurse must understand her responsibility to provide emotional support for both the parents and the child.[13]

The separation anxiety brought about by hospitalization of the preschool child is likely to be less severe than in the case of the toddler. Children who have made a satisfactory adjustment to nursery school and have become accustomed to their mothers' absence from home for a time, generally make a better adjustment to hospitalization than those who have never left their mothers' side for any length of time.[14]

Preparation is most likely to be successful when afforded by the parents. The child should be told why he must go to the hospital, and he should be told the truth expressed as simply as possible.[15]

What a preschool child sees on entering the hospital when he is ill may not be alarming in itself, but it represents a life so foreign to his home experience that he is frightened and overwhelmed. The uniforms of nurses and physicians often frighten a child because uniforms make the people about him look quite different from the adults he knows at home or encounters elsewhere.[16]

LT Miki Iwata, NC, USNR, Naval Hospital, Annapolis, Md., provides ample proof of the excellent rapport which can be established with children.

Parents are often unable to prepare the child for hospitalization because of their own anxiety concerning the child and his illness. Some parents, through ignorance, may even give the child a misleading impression of what to expect.

Pediatric hospitals or services occasionally condition children to think of hospitals as interesting rather than frightening places, with rewarding results. Several institutions now offer prospective patients and members of their family an orientation tour prior to hospitalization. The manner in which a patient is received upon entering the hospital may profoundly influence his perception, whether he is welcome as a human being or is only the bearer of a disease to be treated.[17]

Family Reactions

It is a truism that the nurse's relation with the child's parents is based on the fact that they are the parents of the child in her charge. The patient is the focal point of their relations. Yet the mother may be in greater need of the nurse's sympathetic, understanding, permissive guidance than is an acutely ill child in need of emotional support.[18]

A mother whose child has been admitted to the hospital feels not only that her offspring is separated from her, but also that others are taking her place and providing the necessary care which she, with all her intense love for the child, cannot give.[19]

The mother may ask innumerable, seemingly unnecessary questions. Each is of vital importance to her. Parents want assurance that the child is in capable hands.[20] If the mother is permitted to help with the child's care and if maximum contact is kept between them, she will remain realistic about his illness and the kind of child he is.[21]

A mother often fears that the child's illness is her fault, the result of some error that she has committed. She may overprotect him either through her loving anxiety for his welfare or by hiding this anxiety even from herself. If she feels inadequate in meeting problems arising from the illness, this attitude is reinforced; overprotection is likely to be reduced if the mother's anxiety can be relieved and her self-confidence restored.[22]

A sick child also creates difficulties for his siblings. Normal sibling rivalry is heightened as the sick child receives more attention. Members of the family should be helped to understand the needs of the sick child. An ill child should not be permitted to dominate the family.[23] Parents must give love and reassurance to the siblings, although less attention, and must help them to understand that they are not loved less than the sick child.[24]

Parents often blame themselves too much for the afflictions of their children. They should realize that they cannot expect perfection of themselves or of anyone else. The mother needs guidance in her attitude toward the child's condition and in her concept of herself. The nurse helps the parents and fulfills her own complex role by understanding the normal physical, emotional, social, mental and spiritual aspects of growth and development of children, and the parent-child relationship. Upon this foundation rests the skill and art of nursing as applied to the care of both sick children and concerned parents.[25]

Summary

The significance of the hospital experience for the pediatric patient depends upon his stage of maturity and ability to accept separation from his mother. Growth and development of the child are profoundly influenced by his hereditary background and the care and love which adults bestow upon him. A child desires to repeat happy experiences, exercising his increasing ability to secure the things he desires and to accomplish what he strives to achieve.

The central problem for the preschool child is learning about the world and other people. He requires the freedom of exploration, and the guidance and limitations provided by his parents. He needs security which comes from the love and understanding of his parents.

Upon hospitalization, emphasis should be placed on a functional description of the child's new environment, in addition to psychological and physical support.[26]

Long-term illness and death situations involving the preschool child cause extensive parental anxiety and panic. Emotional overlay exhibited by the parents during this period can be dealt with effectively and smoothly by the pediatric staff with positive attitudes and good communication.[27]

Long-term goals should incorporate emotional, educational and community support measures in order to preserve an acceptable life for the entire family.

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HIGHLIGHTS OF ACP MEETING

Biomedical Engineering was the theme of the 51st annual session of The American College of Physicians held in Philadelphia, Pa., April 12–17, 1970.

Prominent among an impressive array of technical exhibits were multiphasic screening systems components; computerized systems for conducting histories and examinations and assisting in diagnosis; solid state modular physiological patient monitoring equipment; and "life-island" isolation system.

"Meet the Professor" Sessions, first held in Boston in 1968 and expanded in Chicago in 1969, merited the increase in audience to 90 sessions by popular demand. Notable among the "Visit the Investigator" Sessions, was "demonstration of Clinical and Investigational Applications of Intraesophageal Pressure Studies", hosted by CDR D. O. Castell, MC, USN, and LCDR S. M. Levine, MC, USNR, Gastrointestinal Branch, US Naval Hospital, Philadelphia.

The ACP Award Lecture, "Role of Ammonia in the Renal Regulation of Acid-Base Balance" was delivered by Robert F. Pitts, M.D., Professor and Chairman, Department of Physiology, Cornell University Medical College, New York, and a fine lecture it was.

A panel discussion on "Immunosuppressive Therapy of Non-Malignant Diseases" was moderated by John L. Decker, M.D., Arthritis and Rheumatism Branch, National Institute of Arthritis and Metabolic Diseases, NIH, Bethesda. Four panelists included E. V. Barnett, M.D. of Los Angeles, J. B. Kirsner, M.D. of Chicago, F. Parker, M.D. of Seattle and S. M. Wolff, M.D., NIH, Bethesda. Dr. Barnett spoke of Methotrexate as an antiviral drug, causing Dr. Decker to comment that he was not familiar with the concept.

The favorable effect of cyclophosphamide (Cytoxan) on granulomas not responding to other therapy was discussed; however, four deaths reported from hemorrhagic cystitis, one of which occurred following cessation of the drug, were considered worthy of note. In answer to a question from the audience, the panelists reiterated that they had been discussing investigational type drugs, not FDA-approved uses of these drugs, and that a need for further clinical trials was evident. In life-threatening situations, the opinion was expressed that such drugs could not be withheld if the possibility of benefit existed, although it was not the intent of the panel to consider ethical and moral questions which such situations present. The long range effects of therapy, such as cirrhosis, pulmonary fibrosis, and oncogenic complications, remain to be counted. Clinically, the WBC level was not regarded as a necessarily accurate gauge of the capacity to resist or limit infection.

J. S. Lehman, Jr., M.D., presented a paper on "Maximal Urine Concentration in Hydronephrosis

(Due to Urinary Schistosomiasis) With and Without Bacteriuria", authored by himself, Z. Farid, M.D., S. Bassily, M.D., and CAPT D. C. Kent, MC, USN, U.S. Naval Medical Research Unit No. 3, Cairo, Egypt, U.A.R. This unique paper held an attentive audience; the excretory urograms were technically excellent and projected well.

LCDR N. R. Hoffman, MC, USNR, presented a stimulating paper entitled "The Relationship Between Pernicious Anemia and Stomach Cancer"; we are pleased to announce that a comprehensive review of the topic by the author will appear in the next issue of the Navy Medical Newsletter.

"The Role of Prophylactic Oophorectomy in the Treatment of Carcinoma of the Breast" was presented by LCOL F. G. Conrad, MC, Wilford Hall USAF Medical Center, Lackland AFB, Texas. Dr. Conrad recommended that prophylactic oophorectomy be withheld in the case of female patients under 45 years of age. The data was presented supremely well and deserved the compliment for succinctness extended by Chairman T. R. Talbott, Jr., M.D.

CDR D. O. Castell and LCDR S. M. Levine also presented a paper entitled "Effect of Gastric Alkalinization on Lower Esophageal Sphincter Pressure—A New Mechanism for Treatment of Heartburn With Antacids". The paper was delivered by CDR Castell and generated considerable audience enthusiasm, prompting Chairman H. M. Pollard, M.D. to comment that a good Gastroenterology Service must utilize esophageal motility studies. In answer to questions from the audience, CDR Castell remarked that simplified equipment for office clinical and therapeutic use could be devised, and that a limited number of pernicious anemia patients tested by him had not demonstrated elevated sphincter pressures.

"Cardiac Manifestations of Viral Hepatitis" by H. Bell, M.D., University of Kansas Medical Center, Kanas City, was based on a retrospective analysis of 30 cases of viral hepatitis and raised some interesting comments among recognized authorities who had not previously associated a high incidence of cardiac arrhythmia with viral hepatitis but confessed they would be looking for them in the future, having been enlightened.

CAPT W. M. Lukash, MC, USN, presented a paper entitled "Does Physical Exercise Aggravate Hepatitis?", authored by himself, R. B. Johnson, M.D., M. F. Fornes, M.D., J. W. Millar, M.D., and N. E. Manos, Gastroenterology Clinic and Research Branch, Naval Hospital, Bethesda. The paper was well received and concluded that extended activity limitation and prolonged bed rest were no longer warranted in the treatment of viral hepatitis in previously healthy young patients. Dr. Chalmers, in the audience, asked if the patients reported upon had been tested for alcohol effects. Much to the delight of the audience, CAPT Lukash responded gravely that this had not been done, and that the oral use of alcohol was not condoned in our naval hospitals.

Carl V. Moore, M.D. of St. Louis, delivered The John Phillips Memorial Lecture: "Dyssplenism and the Organ of Mystery". The scholarly paper viewed splenic function, which is only partially understood, from the following standpoints: role in blood formation, role in sequestration and destruction of blood cells, role in antibody production, and culling or pitting function.

A Symposium, "Current Medical Problems" was scheduled to permit attendance by all present at the meeting. Roger O. Egeberg, M.D., Assistant Secretary for Health and Scientific Affairs, HEW, was presented by ACP President, Samuel P. Asper, M.D., Chairman. Pointing out that supply must be brought into better balance with demand for health care services, Dr. Egeberg stressed the need for augmenting personnel by expansion of existing institutions, acceleration of training programs, improving communication between Medicine and Government, holding the line on research costs, and sharing of Federal medical services with cooperative effort by VA, DOD and community hospitals to improve medical education for practicing physicians. Dr. Egeberg noted that allied health professionals will not be readily accepted by some physicians, and that a Deputy Assistant Secretary for Health Manpower can be anticipated within the next few months. By his response to problems posed by other members of the panel, Dr. Egeberg inadvertently gave a practical demonstration of the value of communication between Medicine and government, lending further weight to his earlier admonition for members of the profession to advise Washington how to curb health costs, not to look for Washington alone to figure out the ways and means. Panelists were: President-Elect James W. Haviland, M.D.; Vice President Walter B. Frommeyer, Jr., M.D.; Regents Thomas P. Almy, M.D., and Hugh R. Butt, M.D.

"Progressive Impairment of Pulmonary Antibacterial Defense Mechanisms Associated With Prolonged Oxygen Administration" by G. L. Huber, M.D. and F. M. LaForce, M.D., Harvard Medical Unit, Thorndike Memorial and Channing Medical Laboratories, Boston City Hospital, Boston, provoked considerable interest. Based upon studies conducted in 215 laboratory mice, a progressive deterioration

in host resistance to inhaled bacteria with prolonged exposure to high oxygen tensions, was reported. These studies supported the clinical impression that prolonged oxygen therapy increases the susceptibility of the lung to infection. By personal comment during the ensuing discussion, Dr. Huber indicated that the same relationship appeared to exist even when lower concentrations of oxygen were employed.

TO THE MEN AND WOMEN OF THE HOSPITAL CORPS

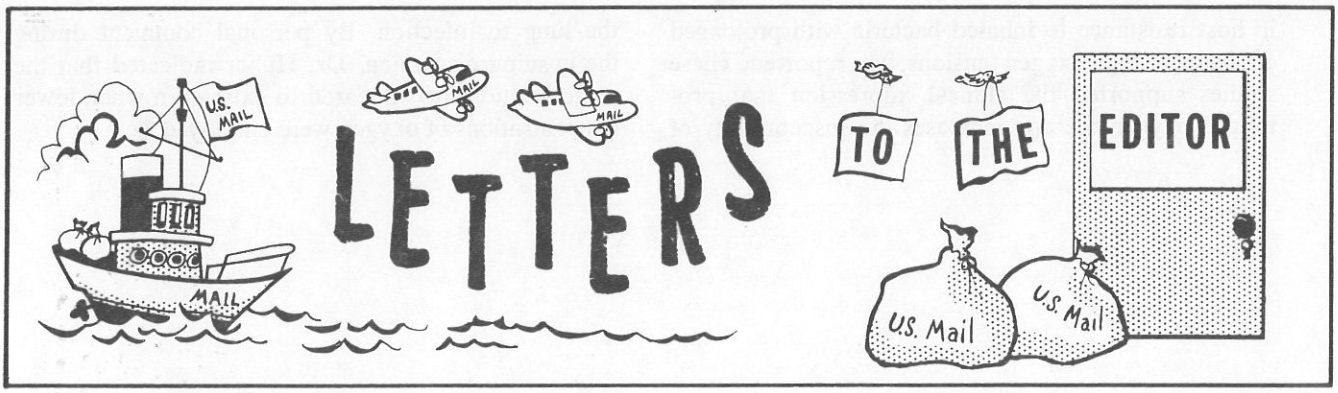
On June 17th, as you pause to celebrate the 72nd Anniversary of the Hospital Corps, please accept my sincere thanks for your outstanding support during the past year.

As we enter a new decade of service to the Navy and Marine Corps, you can take pride in the knowledge that your performance continues to reflect credit upon you and your Corps. Your enthusiasm, whole-hearted devotion to duty, and personal courage—together with the spirit of self-sacrifice that has earned for you a special place in the hearts of your shipmates—has added new luster to the rich tradition of heroic service that has been the hallmark of the Hospital Corps since 1898.

This legacy of valor, that was given to you by members of the Hospital Corps who have served before you, rests safely in your hands. To each of you—wherever you may be—my very best wishes for a Happy Birthday.

G. M. Davis

G. M. DAVIS
Vice Admiral, MC USN
Surgeon General



To the Editor: The back cover of the April Navy Medical Newsletter presents an even better shot than may be apparent at first look. Framed between the heads of Secretary of State and VADM Bringle is ENS (now LTJG) "Jeff" Rogers, USNR, who was actually serving aboard the USS Repose at the time as a line officer, and is the son of Secretary Rogers.

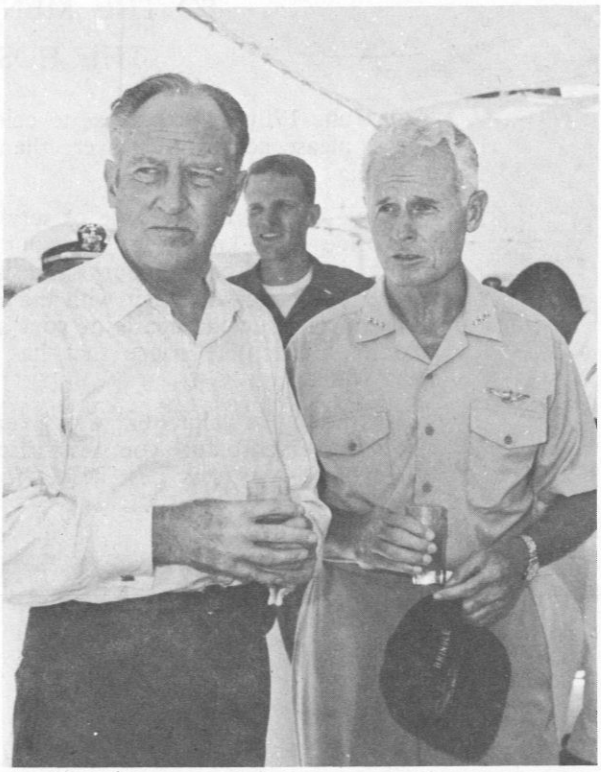
Regards,
CAPT Fred H. O'Connell, MC, USN
Naval Hospital
Philadelphia, Pa.

We're grateful for the tip. LTJG Jeffrey L. Rogers served aboard USS Repose from Nov 1968 to Dec 1969, and was promoted to LTJG on the day he departed the ship. He and CAPT O'Connell were therefore shipmates when CAPT O'Connell served as Chief of Medicine at the Hospital in REPOSE. LT Rogers is presently assigned to duty at OPNAV Op06 as the Assistant for Exchange Programs.

To the Editor: During the past several weeks, there have been loud noises emanating from the passageway and a fury of activity in building four, adjacent to Office of the Inspector General, Medical.

To the newly arrived Navy Medical Newsletter, "Welcome Aboard." Your quick transition from building six to building four was accomplished with record speed, without loss of production. You are to be congratulated.

Sincerely,
HMC D. R. Gereszek, USN
BuMed, Code 12
Office Assistant to Inspector
General, Medical



When all was confusion, chaos, and deadline delirium, our new friends across the hall lent a hand. Their staunch support made the move worthwhile and we're happy to respond, "Hi Neighbor!"

NOTES AND ANNOUNCEMENTS

RETIRING NAVY NURSE CORPS DIRECTOR HONORED

CAPT Veronica M. Bulshefski, NC, USN received the Legion of Merit from VADM George M. Davis, Surgeon General of the Navy, in ceremonies held at the Bureau of Medicine and Surgery in Washington, D.C. She was cited for her exceptionally meritorious service as Director of the Navy Nurse Corps from May of 1966 to May of 1970—a period when the increased nursing requirements generated by the Vietnam conflict were met despite a shortage of Nurse Corps Officers. Her leadership and management of the Nurse Corps during this period were major factors in successfully meeting this demand and in developing the Nurse Corps to its present high level of professional expertise.

CAPT Bulshefski who retired effective 1 May after more than 30 years of distinguished naval service is a graduate of the Hospital School of Nursing at the University of Pennsylvania. She holds a Bachelor of Science Degree in Nursing Education from Indiana University and a Master of Science Degree in Management from the Naval Postgraduate School at Monterey, California.

During her career she served at a number of naval hospitals and is a member of the Pi Lambda Theta Honor Society, The American Nurses' Association, and the Indiana University Alumni Association. In addition to the Legion of Merit, CAPT Bulshefski's service awards include the National Defense Service Medal, the American Theater Medal, World War II Medal, and the Asiatic Pacific Campaign Medal.

She was relieved as Director of the Navy Nurse Corps by CAPT Alene B. Duerk, NC, USN.—PAO, BuMed.

DEPUTY DIRECTOR OF THE NAVY NURSE CORPS HONORED

CAPT Angelica Vitillo, Deputy Director of the Navy Nurse Corps received the Meritorious Service Medal from VADM George M. Davis, Surgeon General of the Navy, on the occasion of her retirement after more than 28 years of distinguished naval service. The ceremonies were conducted at the Bureau of Medicine and Surgery in Washington, D.C.

CAPT Vitillo, who retired effective 1 May, has served as Deputy Director of the Navy's Nurses since July of 1966. She was cited for her major contributions in increasing the effectiveness of the nursing services provided to the naval operating forces.

A graduate of the St. James School of Nursing in Newark, New Jersey, she holds a Baccalaureate Degree in Nursing Education from Indiana University

where she graduated with distinction. CAPT Vitillo is a member of many professional organizations, including the American Nurses Association, the National League of Nursing, the Catholic Council of Nursing, the National Liturgical Conference, the Confraternity of Christian Doctrine, Pi Lambda Theta, Sigma Theta Tau, and the Association of Military Surgeons of the United States.

CAPT Vitillo served at a number of medical facilities during her career and prior to her appointment as the Deputy Director of the Nurse Corps, served aboard USS REPOSE, organizing the Nursing Service on the newly recommissioned hospital ship brought out of "moth balls" to provide medical support for the Vietnam conflict. In addition to the Meritorious Service Medal she has been awarded the American Theater Medal, the Asiatic Pacific Medal, the World War II Victory Medal, the National Defense Medal, the Vietnam Theater Medal, and the Navy Unit Commendation.

She was relieved as Deputy Director by CAPT Dolores Cornelius, NC, USN.—PAO, BuMed.

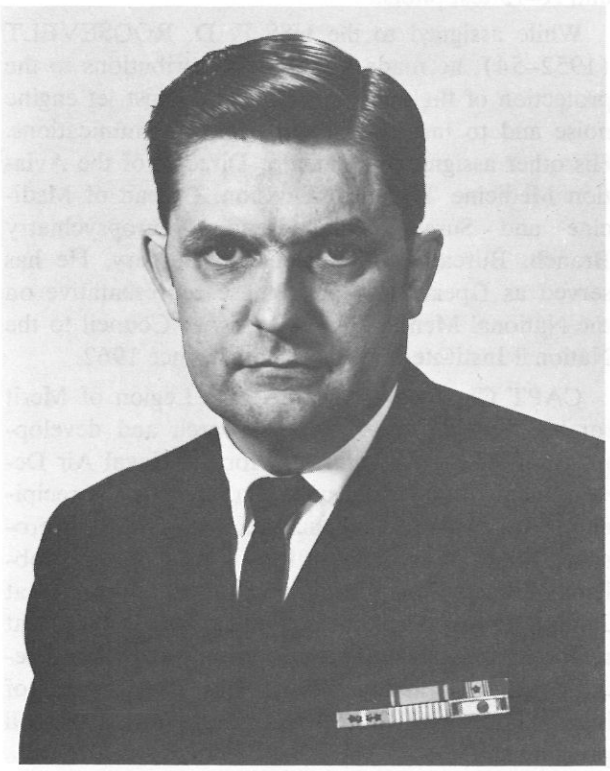
NAVY DENTAL OFFICER PROMOTED TO REAR ADMIRAL

Dr. John P. Arthur accepts his promotion to Rear Admiral in the Navy Dental Corps. He received his two stars in ceremonies held at the Bureau of Medicine and Surgery in Washington, D.C., on 1 May 1970. Looking over his shoulders are Mrs. Arthur (right) and RADM J. W. Albrittain, MC, USN, Deputy Chief, Bureau of Medicine and Surgery (left).

A native of Tularosa, New Mexico, RADM Arthur received his D.D.S. from North Pacific Dental College in Portland, Oregon. He has served at numerous duty stations, ashore and afloat, during his 29-year naval career. Doctor Arthur is currently the Inspector General, Dental, and Deputy Chief of the Dental Division at the Bureau of Medicine and Surgery.—PAO, BuMed.

DOCTOR OF BUSINESS ADMINISTRATION DEGREE

LCDR Charles J. Pearce, MSC, USN was recently awarded the Degree of Doctor of Business Administration by the George Washington University, Washington, D.C. LCDR Pearce is the Academic Director of the Naval School of Health Care Administration, National Naval Medical Center and also received both his Bachelor of Arts and Master of Arts (Financial Management) Degrees from the George Wash-



ington University. LCDR Pearce earned his DBA during the past 5½ years on an off-duty hours basis and is the first Medical Service Corps Officer of the Health Care Administration Section to receive a Doctoral Degree. His dissertation was entitled, "Hospital Administration Education in the U.S. Navy."

APPLICATIONS FOR DENTAL OFFICER EDUCATION PROGRAMS

Dental officers intending to submit applications for assignment to long courses of instruction commencing in Fiscal Year 1972 are encouraged to do so at the earliest possible date.

Applications for full-time training in a civilian institution must be submitted via the chain of command so as to be received in the Bureau of Medicine and Surgery well in advance of, but not later than, 1 September preceding the year in which training will commence. Submission one year in advance enables those officers selected to meet application deadlines established by civilian universities. Applicants should have an academic achievement record of an absolute "B" average or higher.

Applications for postdoctoral fellowship, graduate, and postgraduate courses at the Naval Dental School, and first, second, and third year level residency type training at naval facilities, must be submitted via the chain of command so as to be received in the Bureau of Medicine and Surgery prior to 1 December 1970. Those officers already in residency type training need not submit applications for continuation.

Dental officers applying for training should ensure that the appropriate institutions forward predental and dental school transcripts in sufficient time to permit receipt by BUMED prior to the date specified for the application. Each candidate for postdoctoral fellowship and graduate and postgraduate courses at the Naval Dental School should include with his application a first and second choice of the type training desired. Each applicant should also submit a statement concerning his background, interest, and reasons for requesting such training.

Change 56 to the *Manual of the Medical Department,* dated 17 March 1970, revises Chapter 6, Section XVI, concerning minimum service requirements for various types of training. Requests for training to commence in FY 1972 should contain the training agreement as specified in the sample formats found in paragraph 6–130 of Change 56, to MANMED.

Briefly stated, the revised minimum service requirement for training commencing in Fiscal Year 1972 is as follows:*

(1) Graduate/Postgraduate Long Course in Civilian Institution.—Two years for the first year of training, and year for year thereafter.

(2) Graduate/Postgraduate Course, Naval Dental School.—One year.

(3) Second and Third Year Level of Training (Residency Type).—One year for each year of training.

(4) Postdoctoral Fellowship.—One year.

The 1970 edition of *Dental Officer Education Programs*, NAVMED P–5093, will provide the latest information on educational programs and will be distributed to all career dental officers as soon as possible after publication. The increasingly higher profes-

sional capability of dental officers may, basically, be attributed to the Naval Dental Corps educational programs, and each officer is encouraged to take advantage of one or more of the educational opportunities offered.

**Note*: The revised minimum service requirement is NOT retroactive.

ANNUAL MEETING OF INTERNATIONAL ASSOCIATION FOR DENTAL RESEARCH

The International Association for Dental Research met on 15–19 March 1970. The meeting this year was held in New York at the Americana Hotel.

Over 800 scientific reports were made, four symposia and two general sessions. Dr. Roger Egeberg, Assistant Secretary for Health and Scientific Affairs, Health Education and Welfare, was the keynote speaker. Fifteen naval scientists participated in the program, presenting research reports from seven different naval activities. Four naval scientists were principal speakers in symposia. All reports were given on research supported by the Bureau of Medicine and Surgery. In addition, five reports were given by scientists supported by the Office of Naval Research. Current research programs and problems of mutual interest were discussed at the Navy Breakfast which was attended by 28. CAPT Gordon H. Rovelstad, DC, USN, was elected President for the current year and presented his inaugural address on Wednesday, March 18, 1970.

PRESIDENT OF AEROSPACE MEDICAL ASSOCIATION

CAPT Ralph L. Christy, MC, USN, was named President of the Aerospace Medical Association at the Annual Business Meeting on April 28, 1970. He was formally installed as President during the Hononor's Night Banquet on Thursday evening, April 30, 1970, and will officiate at the 42nd Annual Scientific Meeting to be held April 26–29, 1971 at the Shamrock Hilton Hotel, Houston, Texas.

CAPT Christy is Special Assistant for Medical Department Special Projects, Professional Division, Bureau of Medicine and Surgery, Navy Department, Washington, D.C.

CAPT Christy was born in Kansas City, Mo., but he grew up in Denver, Colo. He received his A.B. degree from the University of Colorado in 1936 and his M.D. degree from the University of Colorado School of Medicine in 1940.

He entered on active duty with the Navy Medical Corps in 1942 and served on aircraft carriers in the Pacific during World War II. From 1946–1952 he was assigned to the Bureau of Medicine and Surgery and the Office of Naval Research.

During this period he had the principal responsibility for the aeromedical and research requirements and design details of the human centrifuge for the Naval Air Development Center at Johnsville, Pennsylvania. This large centrifuge has been used for many projects including training of the astronauts and X–15 test pilots.

While assigned to the USS F. D. ROOSEVELT (1952–54), he made important contributions to the protection of flight deck personnel against jet engine noise and to improved flight deck communications. His other assignments include: Director of the Aviation Medicine Technical Division, Bureau of Medicine and Surgery; and Head, Neuropsychiatry Branch, Bureau of Medicine and Surgery. He has served as Dpeartment of Defense representative on the National Mental Health Advisory Council to the National Institute of Mental Health since 1962.

CAPT Christy was awarded the Legion of Merit for his work in acceleration research and development on the human centrifuge for the Naval Air Development Center, Johnsville, Pa. He was the recipient of the 1964 Eric Liljencrantz Award of the Aerospace Medical Association for his work in the problems of acceleration, development of the centrifuge at Johnsville, anti-blackout equipment and supine seat research and development, and in establishing requirements for and work with the development of high altitude pilot protective equipment and the full pressure suit.

CAPT Christy is a Fellow of the Aerospace Medical Association and the American Psychiatric Association, and a member of the American Medical Association, International Academy of Aviation and Space Medicine, Association of Military Surgeons, American College of Preventive Medicine, American Association for the Advancement of Science and the Washington Psychiatric Society.

CAPT REINHARDT RECEIVES LONGACRE AWARD

The Raymond F. Longacre Award was presented to CAPT Roger F. Reinhardt, MC, USN, at the Honor's Night Banquet of the Aerospace Medical Association meeting on April 30, 1970, for his outstanding accomplishments in the psychological and

psychiatric aspects of aerospace medicine. CAPT Reinhardt is Chief of the Division of Psychiatry and Neurology, Naval Aerospace Medical Institute, Pensacola, Fla.

The Raymond F. Longacre Award, established to honor the memory of Major Raymond F. Longacre, USA, is sponsored by Eli Lilly and Company. It is given annually for outstanding accomplishment in the psychological and psychiatric aspects of Aerospace Medicine.

CAPT Reinhardt graduated from the Medical College of Georgia in 1947. After duty as a naval flight surgeon, he was trained in psychiatry at the Menninger School of Psychiatry in Topeka, Kansas. Prior to his current assignment he was Chief of Psychiatry and Neurology at the U.S. Naval Hospital, San Diego, Calif.

For the past three years, CAPT Reinhardt has been engaged in a large-scale study of failures (attrition) in the program for training replacement pilots for aircraft carrier airwings. This work has been aimed at early identification of those pilots who will be unable to complete the required terminal night carrier qualifications. As a result of the study, it is possible to assign pass/fail predictor scores on pilots as they report in for replacement training. As a by-product, personality profiles for both unsatisfactory and outstanding jet aviators, as well as for the overall jet pilot population, have been worked out and reported. These profiles are very useful in the training of flight surgeons and make for more precise, scientifically sound clinical evaluations of jet aviators. They offer promise in predicting high accident potential in pilots who differ significantly from the mean pilot population. They also have implications for selection and evaluation of airline jet pilots.

Since 1963, CAPT Reinhardt has lectured to more than 1,000 student flight surgeons on the psychology and psychopathology of flying and has expanded that portion of their training. CAPT Reinhardt is a licensed pilot. He is board certified in Psychiatry and is a Fellow of the Aerospace Medical Association and the American Psychiatric Association.

CDR SIMMONS RECEIVES WARD MEMORIAL AWARD

The Julian E. Ward Memorial Award was established by the Society of USAF Flight Surgeons in memory of its first member to have lost his life in an aircraft accident and to honor all flight surgeons whose lives are lost in the pursuit of flying activities relating to the practice of aerospace medicine. It is given for superior performance and/or outstanding achievement in the art and science of aerospace medicine during residency training.

CDR William W. Simmons, MC, USN, was presented the Julian E. Ward Memorial Award at the Honor's Night Banquet of the Aerospace Medical Association meeting on April 30, 1970. He received the award for his outstanding contributions to the profession of Aerospace Medicine in the training operational and research areas by his scholarliness, teaching ability, and pursuit of research studies during residency training at the Naval Aerospace Medical Institute, Pensacola, Florida. CDR Simmons is presently assigned as Senior Medical Officer/Flight Surgeon aboard the USS Constellation.

CDR Simmons is a native of Colorado Springs, Colo. He received his B.A. (1958) and his M.D. (1959) from the University of Colorado; and his M.P.H. degree from University of California at Berkeley in 1959.

CDR Simmons conducted a two-year study on the psychological and physiological effects of long-term isoniazid (INH) therapy on aviators who experience a conversion of the PPD reaction from negative to positive.

NAMRU #4 RESEARCHERS PRESENT PAPERS AT MEETING

Four research scientists in the fields of virology, biochemistry, immunology, and mycoplasma, from the Naval Medical Research Unit No. 4, Great Lakes, Illinois, spoke at the Annual Meeting of the American Society of Microbiology, which was held in Boston from 26 April through 1 May.

Doctor Max J. Rosenbaum, Chief of the Virology Division of NAMRU #4, discussed a new technique for studying viruses which cause the common cold. This new method makes use of a laboratory strain of cancer cells to maintain a proper media for growth of viruses. The procedure, which has been shown to produce reliable results, is less complex and less expensive than the standard methods used.

Mrs. Grace Dow, from the Biochemistry Division, presented a paper on an unidentified substance which inhibits the growth of disease-causing bacteria. This substance is found in the blood and upper respiratory system of most healthy persons. Efforts are being directed toward determining the chemical components of the bacteria-inhibiting substance.

Earl A. Edwards, who is Chief of the Immunology Division, addressed the meeting on the nature of immunity acquired by Navy recruits during recruit training.

York E. Crawford, Chief of the Mycoplasma Division, spoke about a substance which has recently been isolated from a laboratory-produced mycoplasma called an L-form. The substance is used to demonstrate the presence of factors in human blood which inhibit the growth of disease-causing bacteria. —PAO, BuMed.

NAVY LUNAR DECONTAMINATION TEAM

Two men of the Naval Unit, Fort Detrick, Maryland, have been commended by the National Aeronautics and Space Administration for their participation in the Apollo 11 and Apollo 12 Lunar Missions. LTJG James C. Coolbaugh, MSC, USN and HMC(SS) Wayne D. Norris, USN, were responsible for decontaminating the recovery helicopter of the harmful lunar pathogens which might have been brought to earth by the astronauts. The decontamination method which the Naval Unit, Fort Detrick developed and outlined to NASA had been approved by government regulatory agencies. Because of the professionalism and efficiency exhibited in the past by these two men, the Manned Spacecraft Center had requested that they be assigned to the recovery team for the recent perilous flight of Apollo 13.

CAPT Herbert G. Arm, MSC, USN, is Commanding Officer of the Naval Unit, Fort Detrick.—PAO, BuMed.

COURSE ON HOSPITAL-ASSOCIATED INFECTIONS

LCDR Jacquelyn S. Wills, NC, USN, Educational Coordinator at the Naval Hospital, Oakland, California attended a training program "Surveillance, Prevention and Control of Hospital-Associated Infections" presented by the National Communicable Disease Center, 26 January–4 February 1970 in Atlanta, Georgia.

The course provided comprehensive insight into the magnitude and complexity of the existing problems in hospital-associated infections. Principles and methods for surveillance, prevention and control of infections were also presented. The faculty of the training program included nationally recognized authorities from colleges, universities, research centers and the Public Health Service. It was an excellent program which stimulated an increased awareness of the need for nursing personnel in epidemiology and surveillance to achieve a higher quality of patient care through control of hospital-associated infections.

Information obtained from the course will be utilized to update the present Isolation Manual, to improve orientation and educational programs for all levels of hospital personnel in isolation technique, and to improve reporting of potential and known infections.

ANYONE FOR DOWSING?

John Shelly caused quite a stir at the Naval Aerospace Medical Institute, Pensacola, Fla., with his dowsing rod and pendulum, when he returned April 16, as an ex-naval aviator participating as a volunteer subject in the Navy's 30-year old "Thousand Aviator Study."

Doctors and hospital corpsmen at the Institute learned to use the dowsing gear and tried in vain to keep it from pointing down when it found the sought object or water source. By placing material in the end of the pendulum Shelly was able to find similar material, such as hidden pennies. He separated an abnormal X-ray from normal ones while all were covered.

"For our grandfathers it was nothing to find water with a stick," Shelly said. "Every town had two or three guys who could find water, but today science says it is impossible, and anyone who practices dowsing is generally classified as a kook," he continued. Dowsing is a hobby for Shelly, a graduate of North Carolina Sate College, Pratt Institute and Massachusetts School of Art.

While in Pensacola for a periodic checkup to help with the Navy's research project, Shelly had all the space of a local newspaper columnist, two television appearances, and was a guest on "Pensacola Speaks", a local radio program. Calls tied up all lines to the station and the program was extended 30 minutes. President of the American Society of Dowsers, Shelly told callers they could write to Danville, Vermont for membership applications. An elderly lady called to ask "What's wrong with using a peach tree branch" as a divining rod? Shelly indicated that any branch

John Shelly, right, shows Navy Medical Corps CAPT Robert E. Mitchell how dowsing rod is used to locate water and other things, during a recent visit to the Naval Aerospace Medical Institute, Pensacola, Fla. Mr. Shelly reported for a periodic checkup as a volunteer subject in "The Thousand Aviator Study." The ex-naval aviator has pursued dowsing as a hobby for the past six years.

will do. He said GI's in Vietnam are using the rods to find booby traps and arms caches.

The dowser was a naval aviation cadet in 1940 when he was first examined as one of the original 1,056 in "The Thousand Aviator Study," which has developed from a heart research project into a study of the aging processes.—PAO, US Naval Aerospace Medical Center, Pensacola, Fla.

INDUSTRIAL HEALTH WORKSHOP

For physicians, nurses, industrial hygienists, safety and management personnel to learn how to improve their station's Occupational Health Program, an excellent opportunity arises.

A Navy Industrial Environmental Health Workshop is being held in New York City at the Hotel New Yorker, 1200—21 September to 1200—25 September, 1970. The Medical Directors of the Civil Service Commission and the Bureau of Employee's Compensation will be there to assist attendees in solving specific problems in their respective areas. In addition, there will be presentations by experts in the areas of medical administration; heat stress; radiation, noise; toxicology; occupational dermatology; and industrial psychiatry. Attendees are encouraged to present station health problems, medical or administrative, for discussion.

One goal of the Workshop is to develop methods for reducing station compensation costs and lost-time accidents. If one compensable injury can be prevented, the cost to that station for sending participants is probably more than justified.

The Workshop is sponsored by the Naval Ordnance Systems Command Environmental Health Center in cooperation with the Bureau of Medicine and Surgery. The only cost to local commands is travel, per diem, and a $20.00 registration fee.

Nominations to the Workshop may be made by writing to: NAVORDSYSCOM Environmental Health Center, Naval Ammunition Depot, Crane, Indiana 47522, or by calling Autovon 726–1470, extension 820; or commercially 812, 854–1820. Nominations should be made by 10 September 1970.—Code 73, BuMed.

COMBAT AND FIELD MEDICINE PRACTICE

Officer Correspondence Course NavPers 10706B

Medical department officers assigned to USMC forces or to medical units supporting such forces will find the above course interesting and informative. It has been updated recently by medical department personnel immediately after their return from Viet Nam and incorporates the latest changes in medical organization and professional policies.

Enrollment in the course may be effected by a letter of request to Commanding Officer, Naval Medical School, National Naval Medical Center, Bethesda, Maryland 20014. Much of the material in the course is also useful to senior petty officers and enrollment is encouraged.—Code 75, BuMed.

CHANGE OF COMMAND—NAVAL DENTAL CENTER

RADM Myron G. Turner, DC, USN, assumed command of the Naval Dental Center at Change of Command Ceremonies on Thursday, 30 April 1970 at the Naval Training Center, San Diego.

RADM Frank M. Keyes, DC, USN, Commanding Officer of the Dental Center since July 1968, retired from active duty on 1 May. He and his family will reside in San Diego.

The Dental Center, with headquarters at the Naval Station, includes several facilities in the area, among them the Dental Technicians School at the Naval Training Center.

The staff consists of 29 officer and 77 enlisted personnel; in addition the average student population is 400 enlisted personnel.

RADM Turner transferred to San Diego from the Bureau of Medicine and Surgery, where he had just completed two years of service as Inspector General, Dental; and Deputy Chief of the Dental Division. He is a Diplomate of the American Board of Prosthodontics, and his selection for the rank of Rear Admiral was approved by the President on 19 June 1968. He is married to the former Kathleen Trainer of McArthur, Ohio, and they have two sons—Jeffrey B. and Johnathon G. Turner.

IN MEMORIAM

CAPT Robert H. Bradshaw, MC, USN, (Ret.) died on 10 April 1970 at the Naval Hospital, Bethesda, Maryland. Dr. Bradshaw was born 29 August 1912 in West Sunberry, Pa. He graduated from Cincinnati School of Medicine in 1938. From 1943 to 1944 he was under instruction at Pensacola, Fla. and became a Flight Surgeon; he was subsequently assigned to duty at Mayport, Fla. and Coco Solo, Canal Zone. From July 1948 to April 1950 he was stationed at the Naval Air Station, Roosevelt Roads, Puerto Rico. CAPT Bradshaw was assigned to duty at the Naval Station, Annapolis, Md. from 1956 to 1960. In October 1960 he served aboard the USS Forrestal. His last duty station prior to voluntary retirement in September 1968 was as Commanding Officer at the Naval Hospital, Patuxent River, Md.

CAPT David Victor Christiansen, MC, USN, (Ret.), died at the Naval Hospital, Oakland, Calif. on 17 April 1970. Dr. Christiansen was born 20 September 1917 in Ute, Iowa. He graduated from University of Cincinnati Medical School in 1948. He attended the Naval School of Aviation Medicine in Pensacola, Fla. in 1951 and was assigned as a Flight Surgeon to FMF Pacific from 1951 to 1953. Dr. Christiansen also served as Flight Surgeon at El Toro, Calif. in 1954–1955. He completed his specialty training in Internal Medicine in September 1958, and was a member of the staff at the Naval Hospital, Bremerton, Washington from October 1958 to July 1961. From December 1965 to January 1967 he was Chief of Medicine at the Hospital in USS Repose AH–16. He was Executive Officer and Chief of Medicine at the Naval Hospital, Bremerton, Washington from July 1969 to 3 March 1970 when he was placed on the retired list.

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NOTE: Figures indicate the number of issue and page in Volume 55 of the Newsletter. For example: ABSTRACT PAPERS—Actinomycosis: Is it Really Rare? 3:31 indicates that this item may be found in Vol. 55, No. 3, Page 31.

CORRESPONDENCE AND CONTRIBUTIONS from the field are welcomed and will be published as space permits, subject to editing and possible abridgment. All material should be submitted to the Editor, Navy Medical Newsletter, Code 38, Bureau of Medicine and Surgery, Washington, D.C. 20390.

NOTICES should be received not later than the third day of the month preceding the month of publication.

PROFESSIONAL PAPERS AND ARTICLES should be typewritten on one side of the paper, double spaced, with liberal margins. Original and one carbon copy are required. Generic names of drugs are preferred. If the author's present affiliation differs from that under which the reported work was done, both should be given. Unless otherwise indicated, it will be assumed that the article presented has not been previously printed or delivered elsewhere. Papers which have been delivered or printed elsewhere, covered by copyright, cannot be reprinted in the Newsletter without the written permission of the author(s) and copyright holder. It is the responsibility of the author(s) to inform the Newsletter when the material submitted has been previously used or copyrighted. The Newsletter will be happy to request permission to reprint from the copyright holder when this is necessary.

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SUGGESTIONS are invited concerning the Newsletter, its content and form. Comments should be forwarded to the Editor.

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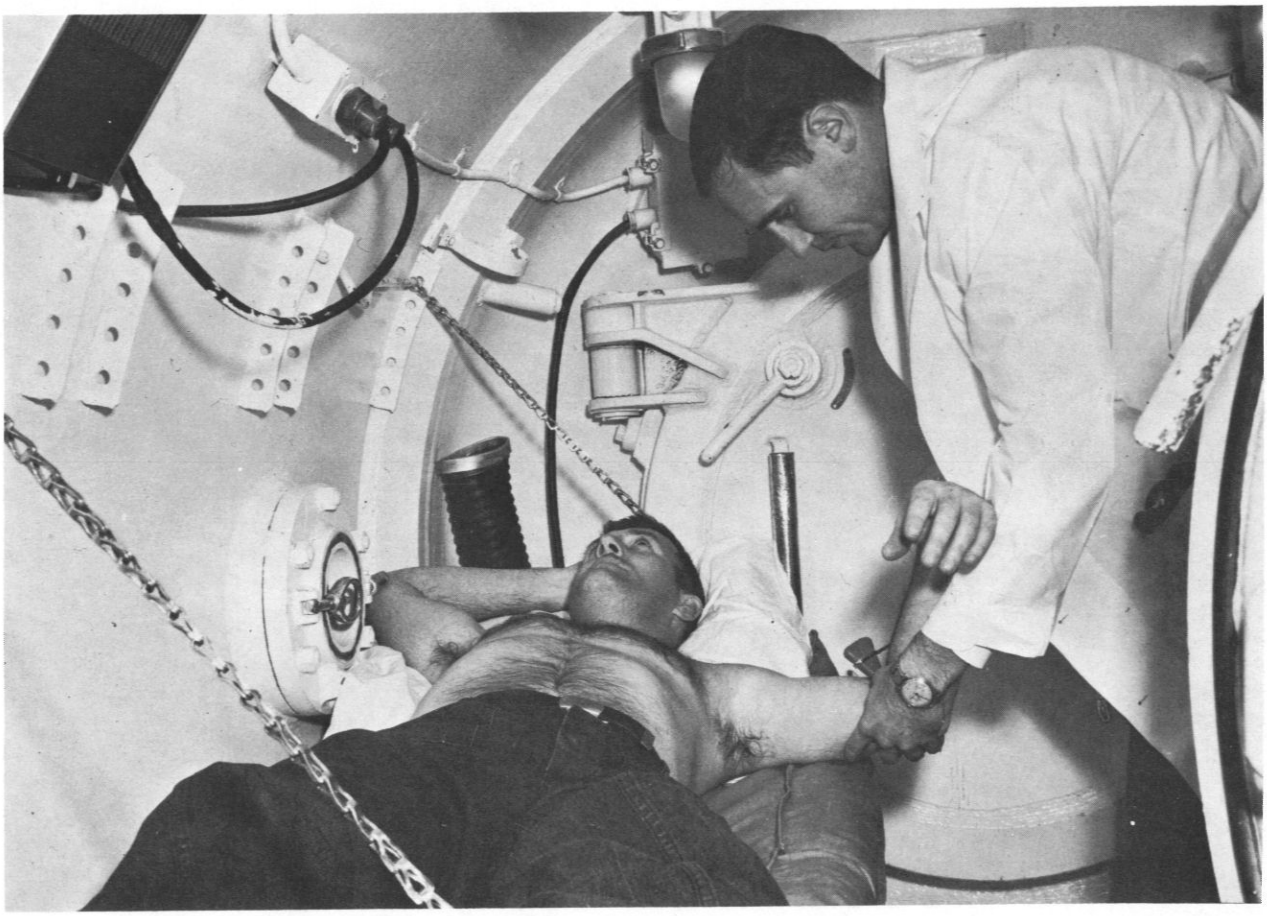

Diving casualties are treated inside hyperbaric chambers. Submarine Medical Officers, using special skills and knowledge, support all Navy underwater activities.

U.S. NAVY MEDICAL NEWSLETTER

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